The

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# Freedom for Supply Development.

THE cry of the moment is for a great development of the uses of electricity for all purposes.

This cry is not uttered because the electrical industry is in a bad way and needs national assistance, but because we are behind other peoples, and because electricity and efficiency have become practically synonymous in both the industrial and the domestic fields.

Increased facilities for cheap production and wider spread distribution if they follow the work of changed organisation and control will naturally be expected to add to the volume of our electrical manufacturing and trade, but that is not the prime concern either of the Government or of others who are engaged in current discussions and investigations.

The main concern of all should be to secure a more generous use of electricity by the population of the United Kingdom for all those purposes and with all those beneficial results which are so well understood by readers of the ELECTRICAL REVIEW that they need not be recapitulated now.

It is well that we should not permit this one great necessity to be lost sight of because sectional discussions are in progress, nor obscured by exaggerated views of possible ill-effects of any movement helping towards the realisation of our desideratum.

Apart altogether from current legislative proposals for promoting advance, and from the fact that various projects have been suspended awaiting detailed particulars of the nature of such legislation, it is common electrical knowledge that in many parts of the country only the mildest sort of efforts are being made to secure the great flood of business that is awaiting us. Stated briefly, there are many thousands of people who would be using electricity, or using more of it, if we could make the way easy for them to get it. Simplification and accommodation are two comprehensive words which express the need from the standpoint of the general public. But we shall not secure these essentials unless we first take the largest possible view of our responsibilities. The community does not exist for the benefit of any section or sections, and sections can only justify their existence in so far as they meet the needs of the community satisfactorily.

Electricity supply authorities—it matters not whether they are municipalities or companies—have no right to allow their undertakings to operate for the benefit of

the few, and they are not fulfilling their responsibilities if they fail to exercise the powers that they already posses for enabling them to give a supply of electricity at reasonable rates to everybody within the area over which they have been granted control. In the present day we have as hard words to use for authorities which either deliberately or apathetically fail to exercise their powers as we ever had for little local authorities which deliberately obtained provisional orders and sat down doing nothing or just trifling with electricity supply, in order to keep more enterprising parties from coming on to the ground. There are unquestionably listlessness and unwillingness among both some companies and some municipalities.

We are able to single out, from time to time, various places in which electrical development is occurring at a most remarkable rate, but there are many where only the fringe of the possibilities has been touched, and this is not due to any need for new legislative action. It is due to failure to recognise the need for exercising to the full responsibilities which should inevitably be considered as the accompaniment of authority granted by the Government.

The foregoing are not new sentiments in the editorial policy of the Electrical Review, nor are they new in the minds of a large number of leading men who want electricity rapidly to advance into the by-ways of our common life. We reiterate them now, however, because it may be found that they have some bearing upon the principal subject discussed in our "Correspondence" columns this week.

Mr. L. L. Robinson seems to have put the fat in the fire by daring to state the other side of the case after reading the Electrical Contractors' pamphlet on "Electrical Freedom." He is occasioning mirth, because he and his authority are working hard to place electricity and electrical service within easy reach of the general body of ratepayers of his borough. His *confrères* recognise that he is succeeding in doing so, and some of them look on with envious eyes. He holds that it is no nearer to Bolshevism or Socialism to give electrical service than it is to give electrical supply, when the private contracting service of his area is less able than his own organisation to secure the popularisation of electricity.

Surely it is the duty of the industry as a whole to do its utmost to increase the uses and sale of electricity. By so doing we shall increase the demand for all classes of electrical manufactures. The more difficult it is made for the consumer, the slower will be the rate of advance and the smaller will be the output of the industry.

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**The New Electricity Bill.**

Three years have passed since the last general Electricity Act, and now a new one is in prospect. These "general" Acts are the ones wherein to get relief from "shoe-pinches." No doubt a few such points have accumulated, which ought to be included in the new Act. There is certainly one outstanding trouble which should be drastically dealt with, namely, that of obtaining definite rights of way for rural mains. Every year the lack of adequate powers to secure wayleaves grows more irksome, and it is high time that the impediments were removed. One has only to note the character of a good proportion of the Special Orders for distributing powers taken out during the last year or so to see the big extensions that are contemplated. The difficulties over wayleaves mean, at the least, a deplorable waste of time, and frequently they result in a definite handicapping of the whole scheme. If the new Bill is to carry out its object of securing a supply in the districts hitherto uncatered-for, an indispensable provision must be that of giving the fullest powers as regards rights of way to the existing distributors. The associations representing the industry should see that if the Bill does not provide fully for this, the necessary amendments are put forward at an appropriate time. This is a matter in which the industry is united, and which interests many municipal undertakings in view of the big new areas for which certain urban local authorities have obtained Orders. What is everybody's business is often nobody's, and if this opportunity is lost, the present state of affairs may drag on for another term of years. The existing undertakings should certainly insist that every possible facility for extending their distribution systems shall be incorporated in the Bill. Consumers, or rather prospective consumers, too, are interested in seeing that this is done; otherwise, despite all the talk of electricity for everybody, they may be left out in the cold.

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**Electricity in Agriculture.**

The paper read before the Institution of Electrical Engineers last week by Mr. R. Borlase Matthews attracted a large attendance of members, who always show their appreciation of "the pictures"; and certainly the films and other illustrations shown by the author were of exceptional interest and novelty, bringing home to the spectators the fact, amongst others, that electric ploughs are at work which can turn six furrows simultaneously at four miles an hour—over an acre per hour. Too much importance cannot well be attached to this subject, for it is to such heavy work as ploughing that we must look for the load that makes rural electricity supply a profitable undertaking, not only to the farmer, but also to the supply authority. When one quarter of the area is arable land, says the author, experience shows that the supply is remunerative even without ploughing by electricity; and the potential demand is enormous—the United States Department of Agriculture estimates that agriculture uses "as much primary power as all manufacturing and central-station plants combined." Over 500 British farmers are using electricity; but Mr. Matthews says that nearly a million farmers in other countries are employing it, and the remarkable statement is made that from 75 to 90 per cent. of the output of the Continental motor manufacturers is now of the agricultural type, which is often used also in factories.

The occasion was noteworthy, in view of recent correspondence in our columns, for the fact that the feeling of the meeting was taken by the President, and it was decided to continue the discussion on Thursday this week, thus meeting the criticism that too little time is available for the adequate discussion of an important subject. This is a reversion to a practice frequently followed by the Institution in by-gone days, with great advantage to all parties.

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**Gas and Electricity.**

Of all the untenable claims that are made on behalf of the gas industry, there is, we think, none more inaccurate—to use the mildest expression—than the allegation that whilst electrical engineers obtain from coal only 20 per cent. of the heat energy that it contains, gas engineers get 80 per cent. The statement appears in various forms. At the recent meeting of the South Metropolitan Gas Co., Dr. Charles Carpenter, in the chair, said that "we *account for* from 97 to 98 per cent. of the energy of the coal, and of this nearly 80 per cent. is *passed on* to the consumer in one form or another" (our italics). These expressions are perfectly true if taken literally, but convey an utterly false impression to the casual non-technical reader and the lay journalist. What boots it to "account for" 98 per cent. of the heat, when the "account" includes losses amounting to 20 per cent.? and whilst it is true that "nearly 80 per cent. is *passed on* to the consumer." how much does he get out of it? Seldom more than half as much as the gas engineer takes credit for, and often much less than that. On the other hand, electrical energy delivered to the consumer is in the most suitable form for complete utilisation with negligible loss. At the meeting of the Gas Light and Coke Co. last month Mr. D. Milne Watson made a similar statement, to the effect that 80 per cent. of the heat value of coal was "recovered" in the production of gas, so that substitution of electricity for gas for heating and cooking would involve the consumption of three or four times the quantity of coal. Mr. H. Woodall at a similar meeting said

80 per cent. of the heat was "recovered." We have no objection to a reasonable degree of optimism, but exaggeration of this order is intolerable.

It is amusing to observe that the prevailing policy of placing the electrical generating station as far as possible from the place of consumption and reducing the cost of energy by transmitting it at high pressure, seems to have spread to the gas industry. The inventor of a process of low-temperature distillation, Mr. Harald Nielsen, has suggested that the price of gas could in most towns be halved by supplying the gas in bulk by long-distance transmission, tapping the main *en route* to serve the intervening districts.

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**German Confidence in the Future.**

IT is stated that when addressing the shareholders of the A.E.G., at the annual meeting held on February 26th, Herr Deutsch said that the directors regarded the future prospects of the electrical industry with extraordinary confidence, as the work of the electrification of the world was progressing at an accelerated rate and the consumption of energy in Germany was far behind that of other countries. Big problems therefore remained for the near future. On the whole, business transactions in Germany had changed owing to the scarcity of working capital and the general depression. Whereas formerly about one half of the company's total turnover was composed of large industrial contracts, such large orders were now entirely lacking, and the turnover was represented by a considerable number of smaller installations and of apparatus and materials which naturally required larger personnel and expenses. There was no doubt that the improvement in the economic situation and the stabilisation of the French franc and the Italian lira would afford an opportunity to the heavy industries to modernise their plants and to place orders for new installations. Herr Deutsch proceeded to express the belief that in the development of the next decade it would be seen that different countries would perceive that capital, labour and experience, and finally technical talent, would only be available to them in a limited measure; and that, according to the existence of mineral resources and the character and composition of their national economic forces, they would have to restrict themselves to the manufacture of normal products in their respective countries and obtain from abroad highly finished manufactures such as machine tools, special machines, and low- and high-pressure plant. Under the circumstances, said Herr Deutsch, the Germans must systematically advocate a reversal of the system of high protection in all countries in order that rational and systematic distribution and production might provide the basis for a new economic development of the European continent.

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**The Future of London Transport.**

THE annual reports of companies interested in electric tramways, and the deficit on the working of the London County Council system during the past year, have again brought into prominence the serious position and worse prospects with which certain undertakings are confronted. Adopting a superficial view, some of the critics allege that the tramway is obsolete, and must give place to the motor omnibus; but those who attach due weight to the considerations involved are by no means of that opinion. For one thing, some provincial tramway undertakings, although offering cheap fares, are showing very satisfactory returns, and their owners are so confident as to their future that in some cases they are expending large sums on renewals and extensions; of these the critics make no mention. Again, the Ministry of Transport, which through its Advisory Committee has made a thorough study of the subject, emphatically states that the tramways are indispensable to transport in London, and will by no means be abandoned. Lord Ashfield, who is at the head of companies operating electric railways and tramways, and motor omnibuses too, whilst deploring the unhappy state of the London transport undertakings as a whole, last week expressed his conviction that tramways should play no small part in the scheme, and could be made more popular. His remedy for the existing troubles was co-ordination of all the agencies employed in London traffic on a stable and satisfactory basis, involving common management and the pooling of receipts, and he expressed the willingness of his companies to enter into negotiations with that end in view. The London Traffic Act of 1924 empowered the Minister of Transport to restrict the number of omnibuses on routes where alternative services were provided, for the express purpose of protecting the tramways from excessive competition, and the Ministry is actually preparing schemes for specified routes.

It should not be forgotten, in all these cases, that tramways carry statutory burdens from which their competitors are exempt—namely, the paving of the roadway, and the transport of workmen at unremunerative fares; the former is a compulsory subsidy to the rates, the latter to a particular class of passenger, and neither can be justified on economic grounds. Also, in London, the tramways are heavily handicapped by their exclusion from the main thoroughfares running east and west and by the absence of adequate connections crossing central London, whilst the omnibuses are free from these restrictions.

With regard to the underground and surface railways, the enormous improvements which have been carried out since the war and are still in progress can hardly be fully realised by those who are constantly using them. Not only are the electrified portions being continually extended to the remoter suburbs, but also in the central area numerous changes have been made which, to one revisiting London after some years' absence, might convey the impression that a new system of railways had been installed. These changes are bound to attract more traffic, which, with the incessant increase in the travelling public, the development of suburban housing schemes and the anticipated revival of trade, may confidently be expected to place the railways in a more satisfactory position. Similar considerations apply to the tramway undertakings, which, we hope, have reached the limit of depression and will soon experience better times.

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**The National Scheme and Unit Cost.**

THE extent to which the enthusiasm of the modern electricity supply undertaking's staff, in getting its unit-cost figure down as low as, or lower than, that of other undertakings of similar capacity and output, is responsible for the excellence of the results obtained is probably not realised by many authorities. This was an opinion expressed recently by the chief engineer of a large modern undertaking, and it raises the question what effect the Electricity (National Development) Bill will have on this spirit. It is beyond all doubt that a lively *esprit-de-corps* between the staffs, controlling, administrative, or working, of electricity concerns, indeed in any phase of industry, is a healthy feeling which should be encouraged and cultivated by all means compatible with efficiency and economy. Under the Bill it is understood that the unit cost and load factor will be figures more or less common to all undertakings and districts, and the possibility under such conditions of the keenness of the staff engineer to outdo his rival being weakened to some extent is not remote. One thing is certain—the chief would lose a strong argument if he were not able to put before his staff the figures of other undertakings as a goal to reach or a score to beat. That the station engineer would deliberately slacken his efforts as a result of the pooling of the energy generated, is incredible; but the psychological effects of a desire to go one better are far-reaching, particularly in a nation of sportsmen. We hope that any tendency towards the damping of enthusiasm from the cause indicated will be counteracted by measures designed to maintain the keenness which is vital to progress and economy.

# Electricity Supply Showrooms.

## Some Recent Developments.

It is satisfactory to note that progress continues to be made by many electricity undertakings in the policy of establishing and maintaining efficient up-to-date showrooms, and some recent visits to showrooms have enabled us to see some new lines of development under varying conditions. Practically speaking, nowadays all showrooms devoted to the exhibition and demonstration of the uses of electricity and electrical appliances are designed and laid out to meet the conditions pertaining to the lives of the bulk of the people to be catered for—the middle classes. Undertakings generally have grasped the necessity of creating the correct atmosphere in their showrooms by furnishing and equipping the various departments to represent the places—domestic or industrial—where the electricity would normally be consumed. Broadly speaking, this necessity only applies to the use of electrical energy in the home, and involves the representation of the usual rooms of the normal household. In this respect it is worth while noting the improvement made to the "atmosphere" when the demonstration room in question is actually a room of normal structure and dimensions. The partly constructed room, with one side open, leaves much to be desired in the direction of making the prospective customer or consumer feel at home, although it is a big advance on what was only a few years ago the usual practice. Probably the emphasised "on-show" effect of the partly completed display room is particularly stressed where the room opens out on some attractive part of the premises such as the reception hall. Where it is deemed necessary to equip the main premises luxuriously, it seems advisable to keep the display rooms, where they are designed to create a desired "atmosphere," shadowed from the outside splendour; after all, the effect must be greatest when the customer is actually in the room with the door shut, whatever is inside or out.

It is interesting to learn of one case where a special lighting-demonstration room, with no windows, is set apart for that particular work. It is always a difficult problem to demonstrate artificial lighting during the daytime, and the difficulty increases with the modern tendency to introduce scenic window effects into the display rooms. Increased attention is being given to the important question of showroom management, particularly as regards the personality and behaviour of the staff. It would not be difficult, we imagine, in an elaborate modern showroom, for the good effects produced or which would have been produced to be destroyed by a want of affability on the part of the staff, brought about, perhaps, by a too stringent control. How far the good results referred to in the description of the North Metropolitan showrooms at Southgate are due to the policy adopted in the management of the staff, it would not be easy to define, but the fact remains that excellent business has resulted since the showrooms have been established. Comparisons cannot, of course, be definitely made between different showrooms and the policies adopted because of the differing controlling circumstances. The Croydon undertaking, for instance, is interested directly only in the supply of electrical energy, whereas with the North Metropolitan Co. the sales of apparatus and general installation work form an important feature in the business of the undertaking.

Fig. 1.—Reception Hall and Showroom, Croydon.

Fig. 2.—Electric House.

### The New Showrooms at Croydon.

Electric House, fig. 2, which was opened recently by the Mayor of Croydon, Councillor A. J. Camden Field, J.P., is situated in the main thoroughfare of Croydon, High Street, and comprises what were, before the reconstruction, four separate premises, 38 and 40, High Street, and two shops in Surrey Street, on to which the new premises now back. The premises occupy seven floors, two of which are below the High Street level and have been allotted to business-development purposes. The principal feature of this department, and probably of the whole concern, is an all-electric flat. This comprises the usual reception rooms, bedrooms, kitchen and bathrooms, and is equipped and furnished to represent an average middle-class dwelling. The rooms of the flat, "Restholm," are complete in every respect, and of normal dimensions. Another important

part of the basement is the all-electric demonstration kitchen. This is equipped with several models of electric cookers and other domestic apparatus, which are hired out by the Electricity Department, and it is interesting to note that on the occasion of the opening function the cookers were all in commission, and the following items were cooked: 250 scones, 50 small cakes, 60 Shrewsbury biscuits, 3 dozen eclairs, 2 dozen sausage rolls, 1 fruit pie, and a Madeira cake.

An industrial exhibition room is another important feature of this part of the showrooms, and is equipped with all manner of industrial apparatus positioned and

Fig. 3.—Electricity House, Southgate.

connected so as to render it possible to hold demonstrations under, as near as possible, working conditions.

The ground floor is devoted to the main reception hall, fig. 1, at the back of which is a large domestic-appliances department, and a demonstration and lecture hall. In the reception hall, which is very artistically decorated and furnished, the consumers' accounts are paid. Very effective electric-fire settings of panelled marble are introduced in this, as well as in other rooms in the building. The domestic-appliances room is equipped with a representative display of most of the makes of electric-lighting equipment. Special plug sockets are fixed in the walls to accommodate brackets already wired and fitted with plugs and grip devices so that different brackets can be shown in any position by simply withdrawing one bracket and inserting another in its place. The lecture hall is provided with a suitable demonstration platform. The upper floors are devoted to the commercial and financial clerical staffs and the management, and also the caretaker's quarters on the top floor; the last mentioned includes an all-electric kitchen. A room is set aside as a library or technical-journal room; this is intended for members of the staff who are encouraged to make use of the room, and thus keep in touch with the latest developments. With the exception of about three large fires in the largest rooms, the offices are heated throughout by electricity. Electric water heaters, with thermostatic regulation, are installed in the lavatories. A feature worthy of note is that most of the rooms and offices are equipped with different electric-lighting apparatus representing the modern makes of equipment and methods of lighting. The display windows occupy one half of the building frontage, the other half being let out for the time being. The windows are equipped for colour- and spot-lighting schemes, and one window is set apart for feature displays and demonstrations in which the local tradesmen will be encouraged to take part.

In conclusion, our thanks are due to Mr. Alex. C. Cramb, M.I.E.E., the chief engineer and manager, to whom we are indebted for the above particulars and his courtesy in showing us round the premises.

### Three of the North Metropolitan Co.'s Showrooms.

The three most recently opened showrooms of the North Metropolitan Electric Power Supply Co. are those at Southgate, Chingford and Harpenden. These form a particularly interesting combination in that the first named represents a fairly large and densely populated partly industrial area, while the other places are almost purely residential and rural; Harpenden in fact is still an old English village. The showroms at Southgate, which were opened in August last, are favourably situated at Palmers Green, with the front of the premises nearly facing the direction of the busy road. Electricity House, fig. 3, is a three-storey building laid out on modern lines. The ground floor accommodates the actual show and demonstration rooms, workshops and stores, and the first floor is devoted to the necessary offices. The top floor is arranged in two flats, occupied by members of the staff. The showroom proper, fig. 4, and reception hall occupy the front of the premises, and is served by two large display and demonstration windows. The room is very attractively laid out, and is designed to afford a welcome to all who enter. A feature of the equipment is a glass shade-demonstration cabinet, in which all manner of shades are placed over fixed lamps on shelves. Particular attention is given to the question of dealing with consumers during the payment of accounts. A small electric cash lift, designed by Mr. C. J. Barnett, A.M.I.E.E., the resident engineer at Southgate, serves the show room and the general office immediately above, and the attendant receives the cash and sends it upstairs where it is dealt with, leaving the attendant free to give his whole attention to the client, thus avoiding the unsatisfactory position which results from the showroom clerk attempting to answer inquiries during the necessary booking of the account. A small room is equipped as a special lighting-demonstration room, being without windows of any description, and another room is set apart and fitted up as an all-electric kitchen, fig. 5, where almost any electrical domestic demonstration can be given at any time. Experience has shown that this system has proved more successful than that when the demonstrations

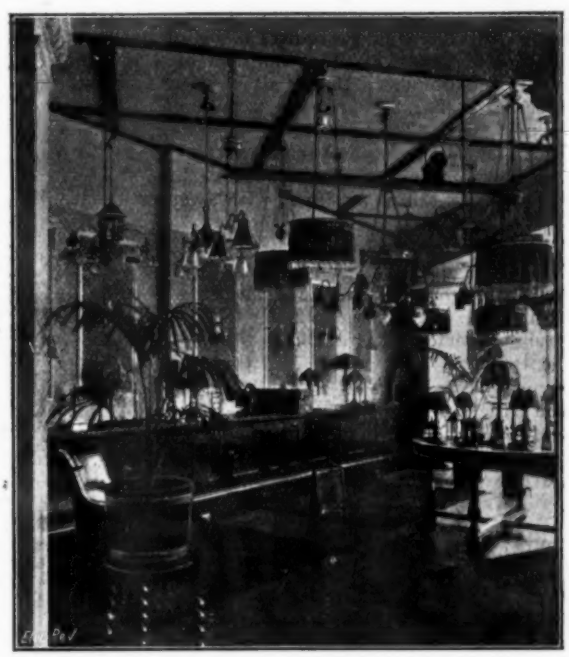


Fig. 4.—The Showroom Proper.

are held in full view of the street, ladies preferring, when attending cooking demonstrations or examining cookers, to be as private as possible. To avoid the staff and workmen, other than those actually employed in the showroom, passing through that part of the premises, separate entrances for the office and engineering staffs and the workpeople are provided. Every effort is made to ensure a happy relationship between the members of the showroom staff, and regulations which may possibly cause irritation are strictly avoided. In passing, it is interesting to note that an

album, filled with excellent testimonials, is suitably placed in the reception hall for the inspection of all interested.

To gain an air of prosperity is the aim of the department, and it is encouraging to know that since the establishment of the new district headquarters, the installation work done by the department has been doubled. The Southgate district was taken over by the Supply Co. in 1911, and the number of consumers now connected to the area network is over 5,000. Special periodical displays are given in the demonstration window, usually

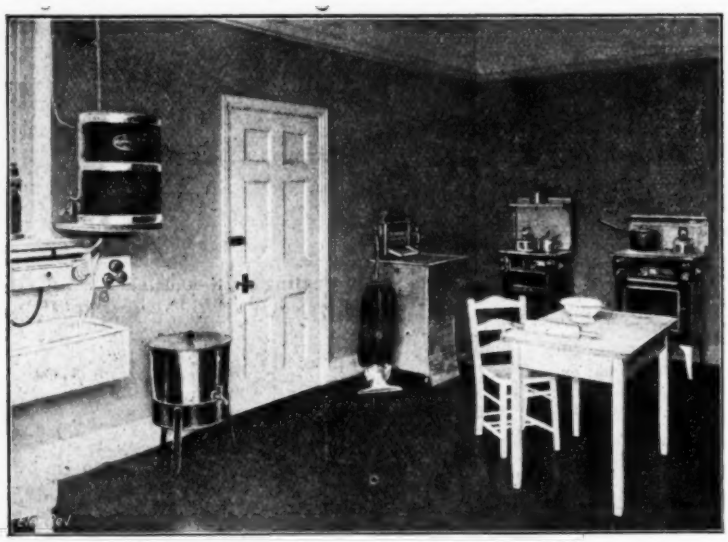


Fig. 5.—All-Electric Kitchen, Southgate.

fortnightly, and the local tradesmen are invited to take part in these.

In contrast to the showrooms at Southgate, those at Chingford are designed to serve a comparatively small area, the number of consumers being at present about 600. The supply to the Chingford area was inaugurated in November, 1923, although the showrooms referred to, fig. 6, were not opened until December of the next year. The premises accommodate the show and demonstration rooms and the offices on the ground floor. The showroom proper occupies the whole of the front of the building, and is equipped with a representative display of the most modern domestic, lighting and heating apparatus of the well-known makers. As at Southgate, arrangements are made with the local tradesmen for special periodical displays in one window set aside for that purpose. A similar demonstration room to that at Southgate is equipped as an all-electric kitchen; this occupies a portion of the rear of the premises, the offices occupying the other part. An outhouse at the back of the building serves as a store, and a sub-station acts as the main receiving and distribution point. This accommodates two 150-kVA, 11,000/415-V, and one 100-kVA, 11,000/3,000-V transformers. The supply is received from the Brimsdown station by overhead line as far as the outskirts of the town, the transmission being continued by underground cables.

The supply and showrooms at Harpenden village are of unusual interest; the area is quite rural, and the undertaking may be regarded as experimental by outside engineers, although it is quite a practical and commercial proposition of the North Metropolitan Company. The area was taken over nearly three years ago, the showrooms being established a few months later, and at the time of our visit 343 consumers were connected to the mains. The premises, fig. 7, constituting the display rooms and offices, is a one-storey building which has been converted from an old wine store. It is arranged on practically the same lines as the premises at Chingford, and is very tastefully furnished and decorated. It is interesting to know that considerable success has been achieved in getting the rural tradesmen to take part in the special window-display work. The windows are equipped with the necessary apparatus for the demonstration of lighting schemes of all descriptions. A feature of the equipment is a lamp-demonstration board designed for comparing various types of electric lamps.

The chief interest in the Harpenden undertaking lies in the fact that the inhabitants of the district are on the whole enthusiastic over the electricity supply, and take advantage of the demonstration and display work of the department. It is encouraging to note that ten cookers are at present installed on the mains, and that the prospects of increase in this direction are good. The main sub-station for the area is located at the back of the premises, and it is connected both to St. Albans and Luton through a 20,000-V cable.

Generally speaking, in districts such as Chingford and Harpenden the company does not establish the showrooms at the same time that the area is taken over. It is considered advisable to wait until some advance with the supply has been made, when the management is the better able to estimate the value a showroom would have in the area.

In each of the North Metropolitan Supply Company's showrooms referred to, the second, or non-feature, window is laid out, in accordance with a general policy adopted by the company, as a "vista" window. This gives a view from the outside right through to the far end of the showroom. This arrangement, when the fittings suspended from the ceiling inside are illuminated, results in a very attractive effect, but it does not lend itself to variation to any great extent. The feature or demonstration window differs from this in that it is provided with a back and has a limited depth. A special department under the supervision of a lady superintendent, Mrs. Walker, arranges periodical feature displays at different times at the branches, one display being removed from one district to replace another elsewhere, and so on.

Fig. 6.—Chingford Showroom.

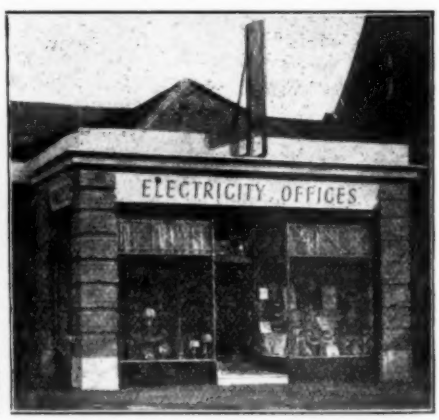



Fig. 7.—The Harpenden Premises.

In conclusion, our thanks are due to Capt. J. M. Donaldson, M.C., M.I.E.E., the chief engineer of the company, for his permission to inspect the showrooms referred to, and to Messrs. Barnett, Wood and Le Feuvre, the resident engineers of the Southgate, Chingford and Harpenden districts respectively, for their courtesy in showing us round their premises.

# Further Notes on Commutation Problems.

By FREDERICK MURGATROYD, B.Sc.Tech., A.M.I.E.E.

VARIOUS aspects of the subject of commutation and brush selection in electrical machinery have been discussed in previous contributions by the writer.* This subject, on the surface so apparently simple, is underneath full of intricate considerations, and it is proposed in the present article to discuss a few more of these problems, namely, copper-picking, the heating of commutators, brush thickness and the fundamentals of brush selection.

### Copper-picking.

This phenomenon, though not very common, can be very troublesome and baffling when it does occur. It consists of a deposition of copper particles on the contact surface of the brush, but takes place only where the current flow is from copper to carbon. Once copper-picking begins, the effect is cumulative, until in the more extreme cases the phenomenon known as "soft copper" occurs, when copper dust is thrown off from the brush contact surface and collects on the adjacent parts of the machine. The main differences between the positive and negative brushes of a dynamo are shown in fig. 1, and it will be noted that the brush which is liable

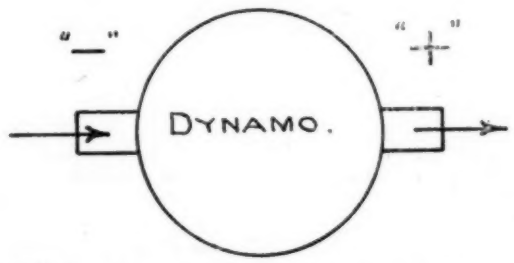



Fig. 1.—Comparison of Positive and Negative Brush Phenomena.

to display copper-picking is also the one liable to wear more quickly and has a lower contact drop. It is obvious that the direction of current flow is primarily responsible for these results, but with regard to copper-picking the current flow from copper to carbon can only be regarded as facilitating some secondary cause. What this secondary cause is has never been established. The action may be in some way related to the presence of occluded gases in the copper and carbon, or may be in part a metallurgical phenomenon. The cause is certainly not purely physical, since it ceases when the current flow is reduced to zero. In the opinion of the writer, copper-picking is due to the presence of a combination of conditions of which minute sparking under the brush is the chief.

It may sometimes be observed that copper-picking has taken place on both positive and negative brushes. This result is to be attributed to the presence of circulating currents in the brushes so that in the case of the brush where the normal flow is from carbon to copper, part of the brush surface has a flow in the opposite direction. The degree of copper-picking is proportional to the current density in the brush and inversely proportional to the intimacy of contact. In fact, the first means of cure is good contact, whereby the minute sparking above mentioned is reduced.

To summarise, the cure for copper-picking is to be found in good contact, low current density, elimination of circulating currents, recessed mica and the use of interpoles. If the mica cannot be recessed, then an abrasive brush should be used.

### The Heating of Commutators and Slip-Rings.

The temperature rise of a commutator or slip-ring is some function of the peripheral speed and of the watts to be dissipated for every sq. cm. of the commutator or ring surface, and may be expressed mathematically as follows:—

$$T = K \times W/[S \times (1+0.1v)]$$

where $T$ = temperature rise in degrees centigrade
$W$ = losses to be dissipated in watts
$S$ = surface in sq. cm.
$v$ = peripheral speed of the rotating surface in metres per second
$K$ = a constant.

For the constant $K$, the figures of 100 for slip-rings and 150 for commutators have been proposed.

The above formula is, however, somewhat cumbrous, and the following procedure is proposed. It has been found not only practical, but to be as nearly infallible as an empirical method can be.

Let us for the moment assume that the temperature rise and peripheral speed are always constant. We can then omit $T$ and $v$ and the formula becomes—$K_1 = S/W$.

Now the losses $W$ are proportional to the brush characteristics and to the machine current. If we eliminate the brush characteristics we have—$\delta = S/A$, where $A$ is the machine current.

The factor $\delta$ is easily determined, being merely the number of sq. cm. of the *cylindrical* surface of the commutator or ring for every ampere passing through the machine.

From the factor $\delta$ we are able to argue backwards and define the necessary brush characteristics for a required temperature rise and peripheral speed. Where the temperature rise and peripheral speed are normal, it is found that $\delta$ should be not less than 5 for a well-ventilated commutator where ordinary carbon brushes are required, and not less than 0.8 for a well-ventilated ring using copper-graphite or pure graphite brushes. For totally enclosed machines, $\delta$ should be increased to 8 or 10 for commutators. In the case of low-voltage machines, such as coppering generators or milking boosters, $\delta$ should be not less than 2, but successful cases are known where $\delta$ is as low as 1.2. Of course, highly metallic brushes are essential in such cases of low $\delta$, and the low voltage generated permits of their use.

### Brush Thickness.

The better the commutating conditions, the thicker may the brush be made with safety. For this reason, brush thickness is of less importance in interpole machines than in non-interpole machines. Commutating conditions are, however, invariably far from ideal, and thick brushes, in spite of decreasing the current density and e.m.f. of commutation, often give rise to commutation troubles of which circulating currents are a prolific cause. It is therefore necessary in practice to reduce the brush thickness to a value which is sufficiently reasonable to avoid excessive commutation e.m.f. Various writers on this subject have specified this reasonable thickness in terms of the number of commutator bars shorted, but machines are so varied that this does not lead to a rule which is generally applicable. Experience with a large number of machines has shown that a much more useful factor is the thickness of the brush expressed as a percentage of the commutator pole pitch. This factor will be called $\gamma$. Expressed mathematically, $\gamma$ is equal to $100\ p\ t/\pi d$, where $t$ is the brush thickness in inches, $p$ the number of poles, and $d$ the commutator diameter in inches.

* "Mica and Commutation Troubles," *Electrician*, July 6th, 1917.
"The Examination of Commutation Conditions in Interpole Machines," ELECTRICAL REVIEW, August 24th, 1917.
"Iron Commutators," ELECTRICAL REVIEW, January 18th, 1918.
"Adjusting Metallic Brushes on Rotary Converter Rings," ELECTRICAL REVIEW, October 3rd, 1919.
"Brush Selection for Electrical Machinery," ELECTRICAL REVIEW, October 17th, 1919.

A good average figure for $\gamma$ in normal machines is 5. For low-voltage machines, a $\gamma$ of 10 to 15 has been found satisfactory. For high-speed commutators, the tendency should be to increase $\gamma$ above 5 if other conditions allow.

To illustrate the use of $\gamma$, in various cases where sparking trouble and quick brush wear has been experienced, $\gamma$ has been found to be 8 or 9, and by cutting back the brushes to make $\gamma$ about 5, the trouble has been cured. Very often by thus cutting back, the current density at the contact surface of the brush has been actually reduced, due to the elimination of excessive circulating currents.

**The Fundamentals of Brush Selection.**

There are four fundamental factors which must be known before a grade of brush can be scientifically selected for a particular machine. Two of these, $\gamma$ and $\delta$, have already been discussed. The two remaining ones are $\alpha$, the current density in the brush in amperes per sq. in., and $\beta$, the peripheral speed of the commutator in feet per minute.

The choice of the best grade should be arrived at from the consideration of these four factors as a group. It is therefore necessary to have in mind what are the normal values for $\alpha$, $\beta$, $\gamma$ and $\delta$ so that any deviation from the normal can be quickly detected and the choice of grade influenced accordingly. For normal machinery using the cheaper grades of carbon brush, these values are as follows:—

$$\alpha=40 \qquad \beta=2{,}500 \qquad \gamma=5 \qquad \delta=5.$$

Having determined the actual values of these factors, it is necessary to examine in what respects any abnormality is present. For instance, if $\alpha$ is, say, 60, it will be necessary to consider the use of a highly graphitic brush with probably a well-recessed commutator. If $\beta$ is, say, 4,000, the brush chosen must not be abrasive, and a lubricator type of brush with recessed mica is indicated. The factor $\gamma$ must be considered in relation to $\alpha$ and the type of machine, and its main use is to indicate whether brush thickness is likely to interfere with performance. $\delta$ is very important since it indicates whether the heating conditions are difficult or easy. If difficult, a brush with low friction coefficient and low contact drop is indicated. If $\delta$ is high, then friction and contact drop are of less importance, and a cheap carbon brush is admissible.

As stated, the four factors $\alpha$, $\beta$, $\gamma$ and $\delta$, must be considered as a whole, and anyone who works on these lines will find the problem of brush selection not only shorn of any mystery, but becoming increasingly easy and reliable as use is made of the method.

# The Metering of Electricity.

## Domestic Supplies in Artisans' Dwellings.

By S. H. PENNING.

The supply of electrical energy for domestic purposes will probably form a very important part of the business of electricity undertakings in the future. There is also strong evidence of a demand arising for domestic supplies for the smaller type of houses occupied by the artisan class. If this tendency is encouraged, it is possible that the demand from this type of house may increase to very considerable proportions, in view of the fact that the great majority of new houses being built at the present time are of this class.

It is also most important that the introduction of the use of electricity into these homes should be pressed from the points of view of cleanliness of the home and atmosphere, and the saving of labour.

The domestic electrical apparatus on the market to-day is far from being perfect, the public generally are unaccustomed to its use; a certain amount of education of the consumer and vigilance on the part of the manufacturer is necessary in order to avoid unnecessary expense and waste and to make them as safe as possible in their every-day use. Probably most important of all is the question of the price of electrical energy for such purposes.

I venture to think that this is one of the greatest stumbling blocks to the introduction of electricity into the home at the present time. Supply authorities still think in terms of lighting, heating, cooking, battery charging, water heating, &c., in connection with the supply of electrical energy for these purposes, and have adopted a multiplicity of charges to cover the various uses to which electricity can be put. In many cases it is very difficult to separate the one from the other; for instance, when a plug is fitted in a dining-room for the use of an electric radiator, what is to prevent the owner from using it for a table reading lamp? It seems absurd to endeavour to force the occupier to install two plugs, one for lighting and another for power.

If electricity is to become popular in the home for the purposes of lighting, heating, cooking, washing, water heating, &c., it will not be possible for the supply undertakings to make distinctions between the various uses to which it is put; they will be compelled to adopt a tariff that will be applicable to all purposes.

Some supply authorities have adopted a low average price per unit for domestic supplies, round about 2d. per unit, but this is little better than a makeshift. It does not please anyone; either it is too cheap if the consumer uses it for lighting only, or it is too dear if he uses it to the extent of, say, a thousand units per annum for an average house.

Due partly to the ignorance of the general public of the use of domestic electrical apparatus and the quantity of electrical energy required to perform certain duties, and to the ease with which electricity can be turned off or on, it is essential have some check upon its use. A very convenient check is found in the prepayment meter, as it is impossible to leave the current on unintentionally without the meter cutting it out of use within a short period by the operation of the prepayment switch. Great improvements have been made in the construction of prepayment meters in recent years, and they can now be relied upon to perform their function accurately and without trouble.

The only suitable tariff to meet the conditions of a supply of electrical energy for general domestic purposes is one based upon the principle of a fixed charge, plus a low running charge or cost per unit. It has been difficult hitherto to apply this principle where prepaymnt meters are in use. In some cases the fixed charge is collected with the rent of the house by the weekly rent collector, the prepayment meter taking charge of the low running charge per unit; this, however, is not always convenient or possible.

The writer devised, some few months ago, means by which the total charge—that is, both the fixed charge and the low running charge per unit—may be collected by the prepayment meter. This is carried out by making the meter advance at a constant speed, its rate being proportional to the fixed charges over a definite period. This may be secured either by making the meter run on shunt, or by the introduction of a small transformer, the secondary of which is connected across the series winding of the meter, the ratio of the trans-

former being so arranged as to give the correct rate of advancement to the meter.

The cost to the supply undertaking of the electrical energy consumed in procuring this advancement will be very small indeed, and represents a very small proportion of the moneys recovered under this head.

The meter can be made to take into account those periods during which the occupiers are away on holiday; on the other hand, some supply authorities may not wish to include such periods, they being in all probability a small proportion of the total time. To cover either of these views, it is only necessary to include or exclude the prepayment switch. If the switch is included in the circuit, the meter will stop when the value of the coin has been entirely used up.

By such an arrangement it is possible to have a prepayment meter rated at one price per unit, but capable of collecting the fixed charge (based upon the kilowatt capacity of the house, its rateable value, or other method of assessing a fixed charge, to which may be added any other fixed sum, such as rental for cookers or other apparatus), and also a small running charge, such charge being proportional to the actual number of kilowatt-hours supplied to the consumer.

In this way the great benefits to be derived from the use of electrical energy in the homes of the artisan class may be secured at a price per unit which will be reasonable, and proportionately cheaper per unit the more it is used—neither too cheap for lighting, nor too dear for a general purpose supply.

# The Broadcasting Committee, 1925.

## Its Chief Recommendations and some of its Observations.

THE Committee of 10, under the chairmanship of the Earl of Crawford and Balcarres, which was appointed by the Government towards the end of 1925, "To advise as to the proper scope of the broadcasting service and as to the management, control, and finance thereof after the expiry of the existing licence on December 31st, 1926. The Committee will indicate what changes in the law, if any, are desirable in the interests of the service," after meeting on 16 occasions and hearing the evidence of 22 individuals and groups, has presented its report* to Sir W. Mitchell-Thomson, H.M. Postmaster-General. At the outset it records its admiration for the work accomplished by the British Broadcasting Co., Ltd., and indicates that it has made full use of the report (Cmd. 1951) of the Committee appointed by the Postmaster-General in April, 1923, under the chairmanship of Major-General Sir F. Sykes, which surveyed the situation then. The principal recommendations are as follows:—

That the broadcasting service should be conducted by a public corporation acting as a trustee for the national interest, and that its status and duties should correspond with those of a public service; it should either be set up by Act of Parliament, or be incorporated under the Companies Acts, limited by guarantee; in either case the corporation should hold the licence of the Postmaster-General for a period of not less than ten years.

The "British Broadcasting Commission" should consist of not more than seven, or less than five, Commissioners, all nominated by the Crown, the first to hold office for five years; one of the Commissioners might, if thought desirable, be one of the existing members of the British Broadcasting Co., and they should have power to appoint an executive Commissioner with a seat on the Board; all Commissioners should be adequately remunerated, and they should appoint, in consultation with appropriate societies and organisations, as many Advisory Committees as are necessary to ensure due consideration of all phases of broadcasting.

The entire property and undertaking of the British Broadcasting Co. as a going concern should be vested in the Commission on January 1st, 1927, and all existing contracts and staff of the Company should be taken over by the new Commission; the Postmaster-General should remain the licensing authority and be responsible for collecting the licence fees; the detection and prosecution of those who conceal their equipment should be vigorously pursued. Provision for experiment and research should be generous, and the Commission should be empowered to raise capital.

The fee of ten shillings for a receiver's licence should be maintained; the first charge on the revenue from licence fees should be the expenditure incurred by the Postmaster-General in connection with the broadcasting service. After paying the Commissioners an income thoroughly adequate to enable them to ensure the full and efficient maintenance and development of the service, any surplus should be retained by the State. The Commission's accounts should be reviewed by the comptroller and auditor general.

The Commissioners should be entitled to all the ordinary rights as regards the use of copyright material (whether in news or otherwise) and it is unnecessary to invest them with any special privilege or preference. The claims of those listeners who desire a larger proportion of educational matter, though relatively few in number, should, if possible, be met; a moderate amount of controversial matter should be broadcast at the discretion of the Commissioners, and licences should be granted to blind persons free of charge.

Although Parliament must retain the right of ultimate control and the Postmaster-General must be the Parliamentary spokesman on broad questions of policy, the Commissioners should be invested with the maximum of freedom which Parliament is prepared to concede; the Commissioners should present an annual report to Parliament.

In the course of its general observations the Committee remarks, *inter alia*:—

The repayment of their subscribed capital to the shareholders in the British Broadcasting Co., provision for its debts and liabilities, cost of liquidation, and the fulfilment of pending contracts, &c., can be made without serious difficulty under the terms of the licence and existing arrangements with the Postmaster-General. The Committee attaches the greatest importance to maintaining continuity between the old authority and the new. Arrangements must be completed in good time, as it would be most unfortunate were there to be any dislocation of the service, or any withdrawal (even temporary) of the programmes for which listeners have paid; the injury caused by any such interruption might be lasting. Where, in view of the changed conditions, it may later on prove necessary to dispense with the service of individuals who would otherwise have been retained, compensation should be paid from the revenue of the Commissioners on a scale to be approved by the Treasury.

However the new Commission be constituted, the organisation of the Board, or governing body, and its Committees seems identical. It has been suggested in evidence that the Board should be composed of persons representing various interests, such as music, science, drama, education, finance, manufacturing, and so forth, but the Committee cannot accept this view, since compromise and even conflict might ensue owing to division of allegiance. On the contrary, it holds that the Commissioners should be persons of independence, free of commitments, and that they will inspire confidence by having no other interests to promote than those of the public service. Advisory Committees, of which a considerable number can be appointed, may frankly comprise advocates, as their duty will be to ensure due consideration for particular phases of broadcasting. The Commissioners should appoint these Committees, and in doing so will doubtless consult societies and organisations which are qualified to advise on questions of *personnel*.

Regarding finance, the Committee assumes that increasing outlay on plant will be necessary; moreover, the Commission must be self-supporting and can expect no grant from public funds. It is anticipated that the overhead and administrative charges of the new authority will rise; its Committees will, in effect, be continuing responsibilities and the control of programmes will be more onerous than hitherto. The duties pertaining to the chairmanship will absorb the greater part of any man's time, and it would be most unfortunate if the programmes came to be treated as matters of routine; even if the cost is considerable, it will prove a wise investment to pay such fees as will secure the best available service.

Outlay on bold experiment should not be meagre; research should be constant, both official and unofficial. The Commission should be empowered to raise capital on the security of its income from licence-fees, and the Treasury might also be authorised to advance capital for approved purposes. All witnesses seem to agree that improvement of the service will increase the number of licensees. When an adequate service has been assured, but not until then, it is expedient that the surplus should be retained by the State.

The Committee points out that it cannot devise an organisation which may not be shown by experience to need revision. On the one hand, it is conceivable that broadcasting might have to become a department of State like the telephone service: on the other, it is possible that its character as a monopoly might have to disappear, and that the rights of transmitting should be distributed. While, therefore, it is essential that the new Commission should be so constituted as to command public confidence, it is equally clear that should

*Cmd. 2599. H.M. Stationery Office; price 6d. net.

circumstances change, the Government shall be able to supersede, or modify, the Commission. It must be laid down that so soon as its licence expires, or is withdrawn, the Commission, on due provision being made for the discharge of all debts and liabilities, shall be bound to transfer, or dispose of, its whole undertaking in such a manner as the Postmaster-General may direct.

The British Broadcasting Co. has enjoyed certain patent rights advantages which may not appertain to its successor. It has been permitted, without royalty, to use some transmission patents which are the property of constituent members of the Company, but even if their continued user is essential to broadcasting, their existence will not impose any impossible burden on the new authority. It will not be to the commercial interests of the patentees to hamper that authority by making such user unnecessarily burdensome, and in this connection Section 29 of the Patent and Designs Act, 1907, may not be without its relevance.

The Committee received a good deal of evidence, sometimes vague, sometimes specific, showing that broadcasting is viewed with alarm by various interests of importance. Such representations have reached it from the Press, concert-givers, proprietors of theatres and music-halls, as well as from owners of dramatic, musical, and literary copyright. Apprehension is generally felt lest broadcasting should supplant existing agencies, professions, or pursuits. The evidence is conflicting, for speculative elements abound, and the Committee is far from convinced that these forebodings are just in that one all-important factor is omitted therefrom. The fears of those who have expressed them are based upon the effect on their existing clientèle, whereas there are multitudes to whom these things are a closed book to-day, whose appreciation may well be brought into being, and formulated in such a manner by broadcasting as to create a new and extensive audience with its fresh demands and requirements. Secondhand versions, even when reception is more perfect than now, are not a full substitute for the original performance, and in the long run art will not be injured by science, nor the printed page be displaced by the spoken word. Broadcasting is not only an institution, but has become a necessity throughout the civilised world. At the same time those who supply the raw material of broadcasting should be adequately rewarded. Experience will prove that apprehensions, though natural enough at present, will in the future be allayed.

The Committee is much impressed by evidence from authoritative witnesses who advocated the vigorous and extended employment of broadcast education in its widest and most liberal sense. A demand exists which deserves every encouragement, although it is clear that educational transmission may in existing circumstances have to give place to other items, and would suffer from such irregularity. A solution may possibly be found in the allocation of a special wave-length for a special subject, perhaps for several subjects, or again for a particular standard of a particular subject, such as music. Scientific and financial problems of magnitude are involved, and meanwhile the Committee recommends the Postmaster-General to continue negotiations which have recently been initiated in connection with a scheme for new high-power stations. The listener is entitled to latitude; he must not be pressed to assimilate too much "highbrow" broadcast, but at the same time every effort must be made to raise the standard of style and performance. The gradual infusion of improved standards will be welcomed by listeners, unconsciously at first, but with growing appreciation amongst those who will instinctively learn to desire better performances.

Appendix I, besides a list of witnesses, contains particulars of written evidence, while Appendix II is a historical summary of the broadcasting service in Great Britain. The expenses incurred in preparing, printing, and publishing the report are estimated at £106.

# An Institution of Fuel Technology.

### Organising Committee Formed.

THERE was a very largely attended meeting at the Institution of Civil Engineers, London, on Friday, March 5th, when the desirability of forming an Institution of Fuel Technology was discussed, and resolutions were passed in favour. The audience contained a large proportion of electrical engineers.

Sir WILLIAM LARKE (Director of the National Federation of Iron and Steel Manufacturers), who presided, said the meeting had been called as the result of a strong desire on the part of a large number of people concerned with the production and use of fuel, to form an organisation on a national basis capable of investigating the whole of the problems concerned in a manner which was not possible to any existing organisation. In reply to the preliminary letter which had been circulated, 400 people had expressed unqualified support, although a small number had dissented or remained neutral. Fuel practice and problems in widely divergent industries, however, had so much that was fundamentally common, that an organisation specially designed to provide a means of co-ordinating experience and results must be to the national advantage and contributory to the general improvement of industrial efficiency. There at present existed an Institute of Fuel Economy Engineers, but he understood that that body was willing to co-operate so that there should be one national organisation of the nature contemplated. It had been suggested by some people that the work of such an organisation dealing with fuel could be carried on as a section of one of the existing institutions, but such a fuel group would not cover the field so effectively as an organisation devoting itself solely to the task.

Sir PHILIP DAWSON, proposing a resolution that an institute should be formed having for its objects the promotion of the efficient production and utilisation of fuel, and the co-ordination of work in this country and abroad associated with the scientific utilisation of fuel in industry—which resolution was seconded by Sir Richard Redmayne—said that in the most efficient electric power stations, fuel represented 50 per cent. of the cost of generation, whilst it represented between 30 and 45 per cent. of the cost of operating locomotives. That was sufficient to show the importance of finding means for utilising more efficiently and more economically the fuel resources of the country. The average quantity of coal used in electricity generation was 2.53 lb. per kWh, but as evidence of what could be done by scientific methods, he mentioned that at the Barton power station of the Manchester Corporation, with a load factor not exceeding 30 per cent., the fuel consumption had been reduced to 1.35 lb. He had just returned from a visit to Germany where he had ascertained that one of the largest steel works there, by the scientific application of heat, had been able to reduce its fuel bill by £25,000 per month, which was equivalent to 3s. per ton of steel made there.

On behalf of the Institute of Fuel Economy Engineers, it was stated that whilst the Council of that body was in full accord with the desire to have one national organisation, it was felt that the existing Institute should be taken as a foundation upon which to build the more comprehensive body, and an amendment to the resolution was moved to the effect that a committee be appointed to confer with the Council of the existing Institute, and enlarge or amend its constitution in any way thought fit. This amendment was eventually withdrawn on an assurance by the chairman that the Institute of Fuel Economy Engineers would be represented on the organising committee, which it was proposed to appoint, thus, in effect, doing what the amendment proposed.

Dr. E. W. SMITH expressed the view that it would be unwise to form yet another institution, and contended that the work in view could be done by a special group of the Society of Chemical Industry, after the manner of the chemical engineering group of that Society, which was an autonomous body with its own committee and officers and its own proceedings. One or two other speakers were inclined to take the same view, but they were heavily outnumbered by those who were firmly convinced that a separate organisation was required, having in mind the fact that fuel entered into all industries in some degree, but that none of the existing societies could deal with it in a really comprehensive manner. It was also explained that the proposed Institution of Fuel Technologists—or whatever name the organising committee might eventually adopt—was intended to have as wide a membership as possible so as to bring in manufacturers and others who at present could not join many of the existing institutions and, moreover, that membership would in no way imply a qualification to practise in connection with fuel technology.

Eventually, the resolution proposed by Sir Philip Dawson was passed *nem con.*

Principal G. KNOX, of the South Wales School of Mines, proposed that an organising committee should be elected to determine the general basis of organisation, and to define more specifically the object of the work of the proposed institution. This was adopted, and amongst the members proposed were Sir Philip Dawson, Mr. S. McEwen, Sir Richard Redmayne, Mr. W. M. Selvey, Prof. R. V. Wheeler, Mr. D. Wilson, and Mr. C. P. Sparks. The chairman gave an undertaking that the committee would deal with the appointment of representatives of the Institute of Fuel Economy Engineers at its first meeting, and it was resolved that the organising committee be requested to prepare a report as to the constitution of the proposed institution, and to make recommendations as to the name thereof.

**Wireless on Aircraft.**—The "Norge 1," the airship in which the well-known Polar explorer Amundsen is to attempt to fly from Europe over the North Pole to Alaska, and which will pass over London on its journey, has been equipped with wireless. By special arrangement with the Marconi Co. the vessel is to be equipped with transmitting apparatus which will enable the commander to keep in touch with either land or ship stations at distances up to 1,000 miles. Receiving apparatus specially designed to cover a wave-range of from 300 to 25,000 metres will also be carried, whilst direction-finding apparatus will be installed which will enable the navigators accurately to determine their course and direction even over the Pole itself when the compasses will be of no navigational value, since all direction will be due south. The direction finder will enable all the long-wave European and American stations to be picked up and oriented with ease, large loops having been erected right round the envelope of the airship; by this means the sensitivity of the apparatus has been made much greater than any hitherto employed on any aircraft. The Marconi Co. is making arrangements to forward any reports from amateurs of reception from the airship during its flight to the North Pole to the wireless officer with the expedition. The airship has been reconditioned in Rome, and is now carrying out its trials.

# Reviews.

**The Dynamical Theory of Gases.** By J. H. JEANS, F.R.S. Pp. 444; 28 figs. London: Cambridge University Press. Price 30s. net.

This is the fourth edition of Dr. Jeans's classic work, which has this year attained its majority. We reviewed the third edition at some length in 1921, and the present issue differs only in that the author has made the few changes necessary to bring the book up to date.

Dr. Jeans stands in the front rank of mathematical physicists, who nowadays occupy a commanding position in the attack on the hidden mysteries of Nature; it is singular that the battle rages at two extremes—around the constitution of the atom on this globe, and about that of the giant suns at distances from us of which the human intellect can form no adequate conception. We are told that in the latter case we have to deal with atoms stripped of their electrons, and therefore able to pack so closely together that the density of the gases is 1,000 times that of platinum. And now we learn that Dr. Millikan has demonstrated the existence of a type of radiation of far shorter wave-length even than X-rays, which he ascribes to nuclear transformations, but as yet we know very little about the structure of the nucleus. The marvels of these explorations of the infinitesimal are as amazing as the intellectual genius which has directed them and interpreted their results; as Dr. Jeans remarks, there is still vastly more to learn than has already been encompassed, and his own work, of which this volume forms a brilliant part, has been most fruitful in pushing on the advance of science into the unknown.

**Photo-Electricity; the Liberation of Electrons by Light, with Chapters on Fluorescence and Phosphorescence, Photo-Chemical Actions and Photography.** By H. STANLEY ALLEN, M.A., D.Sc., F.R.S.E. 2nd Edition, Pp. xi + 320; figs. 43. London: Longmans, Green and Co. Price 18s. net.

This is the second edition of a work by Dr. Allen, the first edition of which appeared in 1913, and forms one of the series of "Monographs on Physics," edited by Sir J. J. Thomson, O.M., F.R.S., and F. Horton, D.Sc., F.R.S.

Great strides within recent years have been made in this domain of science and the appearance of a new edition of the monograph is timely. During the interval since the publication of the first edition much has been added to the knowledge of photo-electricity and probably no branch of physics has made such tremendous advances. A second edition has been rendered necessary due to the modifications in our ideas and concepts of atomic structure consequent on the classical researches of Rutherford, the Braggs and many others, and the distinct change in views as to the relation between matter and radiation by the development of Planck's quantum theory by Bohr. The outstanding advance in the subject is due to Millikan, who has proved that photo-electric emission conforms exactly to the rules of the quantum theory and provides us with one of the most accurate values for Planck's constant.

The author states in his preface that "the chief aim in this edition has been to give a connected view of the subject of the liberation of electrons by ordinary and ultra-violet light, showing how the experimental facts have led up to, and may be expressed in terms of, modern theories of matter and radiation." In this the author has succeeded admirably.

The term photo-electricity denotes the release of electrons by certain metallic surfaces and the change in state of electrification of a body produced by the action of light. The number of electrons released is proportional to the intensity of the light, and there are very accurate methods of determining this number. By photo-electric methods minute changes of magnitude are detected that were concealed from the older methods and there is every indication that the photo-electric photometer, in particular, will make very important contributions to our knowledge of the Universe as a whole. It is capable of measuring the brightness of a star with an accuracy of one thousandth of a magnitude. Photo-electric cells have also been shown to greatly increase the accuracy of measurement of the energy distribution in a spectrum and have been applied in measuring the temperature of a few stars. The photo-electric cell will prove to be an instrument of much value in pure scientific research and in investigations of a technical character, and may rival in certain commercial and industrial applications, the thermionic valve. This affords yet another instance of the uses to which results obtained from highly specialised investigations may be put, and the unforeseen practical applications which may ensue.

By direct photo-electrical methods the existence of X-ray spectrum lines can be traced across from the shortest ultra-violet ray of wave-length about 900 A.U., to the longest X-ray of wave-length 8 A.U. Spectral lines of extremely short wave-length can also be obtained in a vacuum spectragraph so that the gap between the ultra-violet and the X-ray region has now disappeared. The subject of photo-electricity is of considerable theoretical and practical importance through its relation to photochemical processes of all kinds, particularly photography and phototheraphy. Photo-electricity has a direct bearing on photochemical processes in general and photographic changes in particular. Dr. Allen in this monograph has further developed the views of Professor Joly as to the nature of the latent photographic image, and explanations are offered on the complicated phenomena of photographic reversal.

The treatise under review gives a wide survey of the present state of knowledge of photo-electricity. In the introductory chapter an historical review is given. In the succeeding chapters an account is given of the outstanding experimental work on the subject, photo-electric action and fatigue, fluorescence, phosphorescence, photochemical actions, photography, phototheraphy and the photo-electric theory of vision. An important chapter in the monograph is that on the "photo-electric activity of gases," experimental results having already shown that ionisation is produced in the atmosphere of the earth by the solar rays.

The author is to be commended for adopting the admirable plan of limiting the size of the monograph by providing a bibliography of all the relevant papers published on the subject between 1913 and 1924, together with references at the end of each chapter to important articles and books bearing on the subject. The monograph contains much fresh information, Dr. Allen having carried out considerable original work in these delicate investigations and being thoroughly conversant with the extensive literature of the subject, has well summarised and balanced the evidence. The volume will be widely appreciated as a coherent, critical and reliable summary of this branch of physical science, covering a wide field of information, carefully sifted and condensed by one who from experience and aptness is well qualified to supply a clear and comprehensive view of an intricate subject. Much valuable experience is here digested and made easily accessible.

We can only recommend that everyone interested in the recent development of the subject, especially those undertaking further investigations, should study this volume very carefully; it is indispensable and an inspiration, and the only really modern treatise on photo-electricity.

**Exercises in Practical Physics.** By Sir A. SCHUSTER, Sc.D., F.R.S., and C. H. LEES, D.Sc., F.R.S. Fifth Edition (revised). Pp. ix + 373; figs. 136. Cambridge: University Press. Price, 12s. 6d. net.

This well-known laboratory text book is intended for students preparing for final B.Sc. examinations. It covers a course of 73 experiments, and the description of each is accompanied by some discussion of the underlying theory, and of the method of recording the observations and deducing the results. In this course of work there are twelve experiments on General Physics, twelve on Heat, three on Sound, sixteen on Light, and thirty on Electricity and Magnetism. The most important changes since the last edition are the omission of Hygrometry, the addition of an experiment on Newton's rings and an extension of the section on Electricity and Magnetism, which has been raised in standard and brought up to date by the inclusion of experiments on the triode valve, the quadrant electrometer and ionisation currents. The instructions for carrying out the experiments are clear and concise and the apparatus is adequately described. The authors have been content, however, to tell the student what to do and how to do it, and have not included any of those stimulating questions which, no doubt, they would ask of students in their own charge who had worked through the various experiments they have described. They may think, perhaps rightly, that these questions would come better from the teachers concerned.

The first three chapters deal respectively with the Treatment of Observations, the Measurement of Length, and the Measurement of Time. In the first a brief reference is made to the normal probability curve and to a number of theorems bearing on the probable error of a result calculated from a number of observations. In the limited space allotted to it the treatment cannot be very full, but adequate references to standard works are given and the student who wishes to pursue the subject further may easily do so. In the third chapter the given theory is applied to the problem of determining the periodic time of a galvanometer from twelve successive readings of the time at which the needle passes through zero, in a given direction. The readings are taken to the nearest second. The authors show that according to the theory of Chapter I, the smallest probable error will be made in interpreting the observations if the first four and last four only are considered, the middle four being rejected, although they are not regarded as untrustworthy. This process will almost certainly arouse the suspicions of the thoughtful student. The final result is given as 9.656 sec., without any hint that the second figure may be wrong. The acceptance of this result virtually involves the rejection of the second or the eighth reading for which there is no apparent justification. A careful examination of the readings indicates that the true periodic time lies between 9.666 and 9.700, and reveals no reason for suspecting any error of observation in the whole series.

The topic is one which well deserves a place in a book of this kind, but the authors are unfortunate in the particular illustration which they have chosen. It is rather surprising, too, in this connection, that nowhere throughout the volume do they appear to contemplate the use of a stop watch for such measurements as this.

This criticism relates to a very small portion of the book; however, most of the matter is excellent and will be found very useful by degree students in their final years and by teachers in charge of them.

# Business Notes.

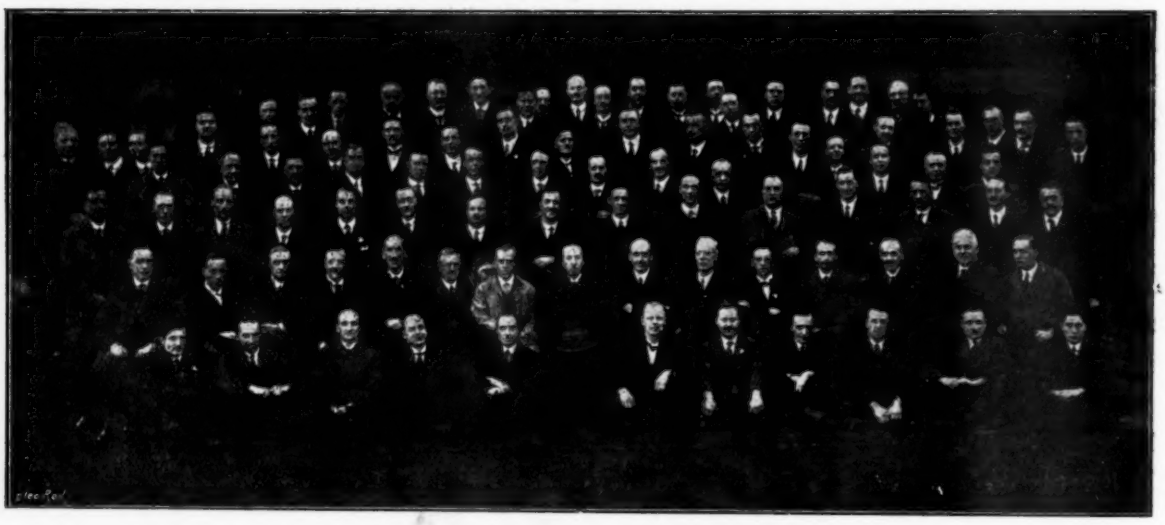
## Commercial and Industrial Developments, Business Changes, Trade Opportunities, New Publicity Literature, Liquidations and Failures.

**Our Next Advertisement Competition.**—We hope to announce in the course of a few weeks, the particulars of our Second Advertisement Competition. It is proposed to run it on the lines advocated by the judges in the last competition, in their article published on page 244 of the ELECTRICAL REVIEW for February 12th, 1926, where they stated that it would be easier to judge the advertisements if they were divided into classes according to manufactures.

**Electricians' Strike Settled.**—The strike of the employés of Messrs. Grierson, who are carrying out the electrical work in the rebuilding of Devonshire House, Piccadilly, was settled last week. The men who were working for less than the standard electricians' rate left the job, and the 600 men who struck work as a protest resumed after a two-days' stoppage.

**A Rating of Machinery Committee.**—The Minister of Health has appointed a committee consisting of the Right Hon. Edward Shortt, K.C. (chairman); Mr. Arthur Body, F.S.I.; Mr. W. Craig Henderson, K.C., Mr. W. H. Patchell, M.Inst.C.E., and Mr. A. H. Preece, M.Inst.C.E., to prepare a statement, in accordance with the provisions of Section 24 of the Rating and Valuation Act, 1925, setting out in detail all machinery and plant which appears to them to fall within any of the classes specified in the Third Schedule to the Act. The secretary is Mr. A. N. Rucker, Ministry of Health, Whitehall, S.W.1.

**A Visit to the Chloride Works.**—On February 16th about 100 members of the South Lancashire Section of the Institution of Post Office Electrical Engineers paid a visit of inspection to the works of the Chloride Electrical Storage Co., Ltd., at Clifton Junction, near Manchester. Very efficient arrangements were made for the reception and conducting of the visitors over the works, enabling them to understand fully all that they saw. The party was particularly interested in the examples of Post Office standard battery plates and cells for the new automatic exchanges. At the end of the tour the party and a number of the company's officials were photographed on the lawn at Crompton Fold, adjoining the works. This photograph is reproduced herewith. A speech of thanks was made by Mr. Herbert, on behalf of the Institution, and Mr. G. Stevenson, A.M.Inst.C.E., replied for the company.



Post Office Electrical Engineers at the Chloride Works.

**Lighting Development in the Midlands.**—On Tuesday, March 2nd, a meeting was held in the Queen's Hotel, Birmingham, to discuss the formation of a Lighting Service Bureau to serve the Midland area. A luncheon was arranged under the auspices of the E.L.M.A., and many gentlemen, prominent in the supply, wholesale and retail sections of the industry, were present. Mr. J. Y. Fletcher presided at the meeting, and, after addresses by Mr. C. W. Sully and Mr. W. E. Bush, a resolution in favour of the inauguration of a Lighting Service Bureau for the Midland area was proposed by Mr. R. A. Chattock and seconded by Mr. S. T. Allen. After several speeches by visitors in favour of the resolution, it was carried unanimously by the meeting.

**Mining Automatic Telephone Approved.**—The INTERNATIONAL ELECTRIC CO., LTD., informs us that its automatic telephone system for mines has been approved by the Home Office under Regulation No. 132, after passing tests at Sheffield University.

**Developments in the Radio Industry.**—The *Broadcaster and Wireless Retailer* reports the formation of a new Society of Radio Manufacturers, of which Mr. W. H. Lynas is chairman *pro tempore*. Among the objects of the new body are the supporting and enforcement of all agreements entered into between the Society and its members or between the Society and other organisations for the strict maintenance of retail prices; and the approval and promotion of radio exhibitions. The Society, although primarily for the British manufacturer, permits the membership of foreign firms under certain conditions, as well as sole concessionaires for apparatus. Meanwhile the N.A.R.M.A.T. proposes to continue after reconstruction, and, according to Mr. Lynas, has approached seceding members with a view to their return. Particulars of the Society of Radio Manufacturers can be obtained from Mr. W. H. Lynas, 25, Savile Row, W.1.

**The Threatened Engineering Lock-out.**—The employés of Messrs. R. Hoe & Co., Ltd., last week decided to ignore the advice of the national executives of their unions to return to work pending negotiation regarding the matters at issue. Consequently the employers' lock-out notices posted on Friday last will operate to-morrow (Saturday) unless there are further developments after we have gone to press. A meeting of representatives of the London District Committees of the unions concerned met on Friday last and declined to endorse the national executives' advice to the men to return to work. An endeavour is being made to hold up public utilities in the event of the employers' proceeding with the lock-out, and a meeting of representatives of the unions was to be held to-day to discuss the matter.

In the meantime, at last Friday's meeting the engineering unions (London district) decided to proceed with their claim for an all-round increase of 20s. per week for their members and to ask for authority to take a ballot upon strike action. It was also proposed to secure authority to take a ballot upon the continuance or abandonment of the existing agreement relating to the avoidance of disputes which has been broken by the strikers at Messrs. Hoe's works.

**Burnley and the E.D.A.**—At a meeting of the Burnley Town Council on March 4th, Councillor Lees said that £56 seemed to be an extraordinarily big subscription to pay to the Electrical Development Association. Alderman Nuttall replied that the Association did a lot of publicity work and Burnley was greatly indebted to it. When the recent exhibition was opened the Association sent a representative who was of considerable assistance, and whose speech at the opening was worth the full subscription. They were asked to subscribe on the basis of energy generated, and the amount mentioned was in that proportion.

**Unemployment.**—There was a further reduction in the number of unemployed registered at the Employment Exchanges during the week ended February 22nd. At that date the total was 1,125,800, as compared with 1,139,228 on February 15th, and 1,236,065 on February 23rd, 1925.

**A Multi-Circuit Radio Device.**—A useful device for those interested in the construction of radio receiving sets has been produced by the IGRANIC ELECTRIC CO., LTD. This takes the form of a seven-part folder which by simple manipulation can be made to show nine theoretical circuits, with corresponding pictorial diagrams, relating to a number of sets from a simple crystal set to a 4-valve receiver.

**Social Events.**—The staff of the Sterling Telephone and Electric Co., Ltd., Dagenham, met at dinner in the Abercorn Rooms, on February 20th. Mr. W. H. Peak, O.B.E., managing director, presided, and was supported by Mr. C. E. Hunter, works manager, and Mr. N. Blades, chief telephone engineer. The loyal toast was proposed by the chairman, and the toast of "The Firm" was proposed by Mr. N. Blades, and responded to by the chairman. A splendid musical programme was provided by members of the staff.

On February 27th the staff and employés of the Doncaster Corporation Electricity Department held their first annual dinner at the Red Lion Hotel, when there was an assembly of 75 persons, including Councillor T. Bramworth, chairman of the Electricity Committee, and other members of the committee. Mr. S. R. Windle, borough electrical engineer, presided, and gave the toast of "The Visitors," to which Councillor Bramworth replied.

The annual dinner of the employés of the Poplar Borough Council Electricity Department was held recently. During the evening Mr. Horace Bowden, the borough electrical engineer, was presented with a silver smoker's cabinet to mark his completion of twenty-one years in his present office.

**Works Extension.**—INTERNATIONAL COMBUSTION, LTD., informs us that it is considerably extending its Derby works at which "Lopulco" pulverised fuel plant is produced. The extensions include a new foundry section for heavy castings, and machine and sheet-metal shops. The transport arrangements are also to be improved.

**Trade Announcements.**—MR. W. A. WOOD, A.M.I.E.E., has opened an electrical contracting business at 131, London Road, Bedford, and would like to receive catalogues dealing with lighting, heating and power apparatus.

THE EASTERN ARMATURE WINDING CO. has removed to 73a, Garford Street, Poplar, E.

From to-morrow the address of MESSRS. WATSHAMS, LTD., will be: Windsor House, Victoria Street, London, S.W.1.

On Saturday last the WEINBAU INCANDESCENT & ELECTRICAL Co., 327-335, Commercial Road, E.1, opened new premises. The front of the building is flood-lighted and on the first floor is a fittings showroom containing over 600 types of lighting fittings, each wired independently of the others. Ample trade facilities are available.

**Catalogues and Lists.**—MARCONI'S WIRELESS TELEGRAPH Co., LTD., Marconi House, Strand, W.C.2.—Leaflets Nos. 1,053 and 1,054, dealing, respectively, with an extra selective receiver, and wireless call apparatus.

MESSRS. L. MCMICHAEL, LTD., Wexham Road, Slough, Bucks.—An illustrated leaflet advertising "Dimic" coils. Priced.

RAY MANUFACTURING CO., 350, Fishponds Road, Bristol.—A pamphlet dealing with the "Marshall" constant-potential battery-charging system.

THE BRITISH THOMSON-HOUSTON CO., LTD., Mazda House, Newman Street, Oxford Street, W.1.—Folder L.259, containing details and prices of the "Tungar" battery charger.

POPE'S ELECTRIC LAMP CO., LTD., 5, Arthur Street, New Oxford Street, W.C.2.—Folder No. 3,760, giving prices of "Elasta" vacuum and gasfilled lamps.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—The "Osram Bulletin" for February, containing notes on "Osram" installations, "Gecophone" radio apparatus, &c. This issue includes articles on the illumination of Bush House, Baker Street, and the Hearts of Oak Building (Euston Road).

THE JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, S.W.1.—A blotter with a calendar for March, illustrating the company's boiling plate.

SIEMENS & ENGLISH ELECTRIC LAMP CO., LTD., 38-39, Upper Thames Street, E.C.4.—March price sheet of electrical accessories and appliances. Fully illustrated.

THE MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, W.1.—An illustrated and priced pamphlet (No. 390 D) dealing with "Sterling" loud speakers.

THE BRITISH-THOMSON-HOUSTON CO., LTD., Mazda House, Newman Street, Oxford Street, W.1.—A coloured and priced pamphlet dealing with "Mazda" colour-sprayed lamps. Also a mailing card advertising B.T.-H. radio valves.

THE BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, Tottenham, N.17.—The "Benjamin Reflector" for February-March containing notes on industrial and commercial illumination and other matters.

RADIO INSTRUMENTS, LTD., 12, Hyde Street, New Oxford Street, W.C.1.—An illustrated pamphlet containing particulars of a new l.f. transformer with tappings to give seven different ratios.

MESSRS. HERBERT MORRIS, LTD., Loughborough.—Book 108, illustrating and describing worm-geared pulley blocks, and pamphlets dealing with battery trucks and vertical cross-tube boilers.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—A catalogue of paper-insulated cables containing exhaustive particulars of each type.

MESSRS. BAXTER & CAUNTER, LTD., 219, Tottenham Court Road, W.1.—A price list (March) of electrical materials, appliances, and accessories, including wiring devices, cookers, fires, &c.

MESSRS. HENRY JENKINS & SONS, LTD., Unity Works, Victoria Street, Birmingham.—A well-illustrated and priced catalogue of lighting fittings, principally open and closed bowls.

**Bankruptcy Proceedings.**—W. J. AYLING, 2, Rosemount Villas, Ballards Lane, North Finchley, Middlesex, late electrical engineer.—The public examination of this debtor was held recently at the Court House, Barnet. The statement of affairs showed liabilities of £1,052, against assets of £7, leaving a deficiency of £1,045. Debtor attributed his failure to being unable to obtain money owing to him by a limited company which he promoted from his own business. He stated that he commenced business in 1900 as an electrical engineer at New Southgate, and subsequently traded at various other places. In July, 1920, he paid a composition of 7s. 6d. in the £ to his creditors on liabilities of £90, and in November, 1924, he transferred the business which he was carrying on at Edgware to a private limited company, of which he was appointed managing director. The examination was formally adjourned to be closed.

JOHN RIGG, chauffeur, Revidge Road, Blackburn, and FRANK STEAD, engineer, Samlesbury, trading at Old Chapel Street, Blackburn, as Rigg & Stead, radio engineers.—These debtors underwent their first examination at Blackburn Bankruptcy Court, on March 3rd. The liabilities were £250, and the deficiency £128. Debtors attributed their failure to want of capital and increasing competition in trade. Stead said when the partnership was commenced he put in £100 in plant and capital and Rigg furnished £100. They each took £3 a week in wages. They were solvent until their stock was sold by auction, when it did not realise the figure expected. Following the examination of Rigg, the Official Receiver asked for an adjournment so that Stead might furnish additional details regarding some furniture. This was granted.

JOHN F. STANIFORTH, wireless salesman, Central Beach, Blackpool, and formerly of Scarborough.—This debtor was examined at Blackpool Bankruptcy Court, on March 5th. The accounts showed liabilities of £923 and a deficiency of £903. Debtor attributed his failure to bad trade. The examination was adjourned.

H. E. MALLINSON, electrical engineer, Portelet, Tomline Road, Felixstowe.—Trustee, Mr. H. S. Gotelee, Official Receiver, 9, Arcade Street, Ipswich, released February 23rd.

J. A. REFOY (Varley Radio Co.), dealer in wireless apparatus, 178, Ancona Road, Plumstead.—Last day for proofs for dividend, March 17th. Trustee, Mr. T. Gourlay, 29, Russell Square, W.C.1.

T. A. WICKHAM, electrical engineer, Snaresbrook, Station Road, New Milton, Southampton.—First and final dividend of 2s. 10d. in the £, payable at the Official Receiver's Office, Midland Bank Chambers, High Street, Southampton.

A. KERSHAW and C. H. WOOD (Kershaw & Wood), electrical engineers and merchants, 9, Bradford Road, Dewsbury—Supplemental dividend of 8¼d. in the £, payable at the Official Receiver's office, 12, Duke Street, Bradford.

A. KERSHAW (separate estate).—First and final dividend of 4¼d. in the £, payable at the Official Receiver's offices, 12, Duke Street, Bradford.

C. H. WOOD (separate estate).—First and final dividend of 4d. in the £, payable at the Official Receiver's office, 12, Duke Street, Bradford.

C. J. BROOKES, wireless and gramophone dealer, 6, Cross Street, Wigston Magna, Leicester.—First meeting, March 12th, at the Official Receiver's office, 1, Berridge Street, Leicester. Public examination April 9th at the Castle, Leicester.

A. F. WEBB, electrician, 102, Duke Street, St. Helens, Lancs.—First meeting, March 12th, at the Official Receiver's offices, 11, Dale Street, Liverpool. Public examination, April 13th, at the Court House, Liverpool.

M. KELLY, radio apparatus dealer, 12, Jackson's Row, Manchester.—First meeting, March 15th, at the Official Receiver's offices, Byrom Street, Manchester. Public examination, April 16th, at the Court House, Manchester.

A. F. KINGDOM, electrical and mechanical engineer, Tavistock Street, Devonport.—First meeting, March 15th, at 11, St. Aubyn Street, Devonport. Public examination, April 9th, at the Guildhall, Plymouth.

T. BARTON, electrical engineer, The Electric Works, Ainsworth Street, Blackburn.—Application for discharge, to be heard April 19th, at the County Court House, Blackburn.

**Company Liquidations.**—WESTON ELECTRIC LIGHTING CO., LTD.—A meeting of members is called for April 6th, at 37, Mawdsley Street, Bolton, to hear an account of the winding-up from the Liquidator, Mr. J. Greenhalgh.

RADIO EQUIPMENT CO., LTD.—Winding-up order made March 2nd.

C.A.C. (RADIO), LTD.—A petition for the winding up of this company has been presented to the High Court by Messrs. Honeywill Bros., Ltd., of 79, Mark Lane, E.C., creditors, and will be heard in London on March 16th.

SCIENTIFIC RADIO, LTD.—Winding up voluntarily. Liquidator, Mr. J. E. Hartles, Alston Buildings, Spiceal Street, Birmingham.

**Dissolution of Partnership.**—C. LINDOP & Co., electrical and mechanical engineers, 8, Lower Breck Road, Liverpool.—Mr. J. L. Sleightholme and Mr. C. F. Lindop have dissolved partnership. Debts will be attended to by Mr. Sleightholme, who will continue the business under the same style.

**Receiver Appointed.**—SHENTON & Co., LTD.—Mr. W. B. Pearson, 5, John Street, Bedford Row, London, W.C.1, has been appointed receiver and manager. He is continuing the business and hopes that the ordinary creditors will eventually be paid in full.

**Private Arrangements.** — Albert Maund, electrician, Hoghton Street, Southport.—A meeting of creditors was held on March 5th, at Southport, when a statement of affairs was presented which showed liabilities of £1,320, and net assets of £457, leaving a deficiency of £863. It was reported that the debtor was originally employed by a firm of electrical engineers, but started trading in partnership many years ago at Lord Street, Southport. In 1902 the partner retired, but the debtor was then joined by another. The second partner died about fifteen years ago, and since that time the debtor had traded alone at various addresses. During the twelve months to June 30th, 1922, the sales were £3,797, but there was a net loss of £329. The following year the turnover fell to £3,015, but there was a net profit on the trading of £64. In the succeeding twelve months the sales still further declined to £2,568, with a net loss of £106. During the year to June 30th last the sales increased to £3,020, with a net profit of between £300 and £400. Since June 30th, 1925, the sales had been £1,416, with a net loss of £140. A resolution was passed in favour of the matter being dealt with under a deed of assignment, with Mr. Bond, of Messrs. Davies & Crane, of Southport, as trustee, together with a committee of three of the largest creditors. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Electric Lamp Factors, Ltd. | ... 210 | Rowe Bros. & Co., Ltd. ... | ... 73 |
| General Electric Co., Ltd. | ... 45 | Ward & Goldstone, Ltd. ... | ... 29 |

F. C. Brown (Electricity), Ltd., Union Street, Coventry.—A meeting of creditors was held recently, when a statement of affairs was presented which showed liabilities of £1,440, and net assets of £589, leaving a deficiency of £851. An offer of a composition of 2s. in the £ was submitted, it being stated that there were hopes of the business being carried on successfully. After some discussion the amount was increased to 2s. 6d. in the £, payable on August 1st next, and guaranteed; this was accepted.

**For Sale.**—Motherwell and Wishaw Burgh Council Electricity Department invites offers for one Willans-Siemens 1,100-kW d.c. turbo generator with surface condenser, &c., four Willans 500-kW generating sets with condensers and auxiliaries, three B. & W. boilers with grate stokers, induced draught fan, economiser, &c. Messrs. Veryard & Yates will sell by auction on March 16th and following days at the British Empire Exhibition, Wembley, large quantiites of electrical cable and equipment, generating sets, motors, electric lamps, switchboards, &c. Walthamstow Urban District Council Electricity Department has for disposal two Belliss and Morcom triple expansion engines, direct coupled to Siemens Bros. & Co. generators, complete with air and circulating pumps. Dundee Corporation Electricity Department invite offers for two 2,000-kW Willans-Parsons steam turbines, coupled to Dick Kerr 3-phase alternators, with condensers and air pumps. Messrs. Jackson & Greenen, of 5, Yelverton Road, Bournemouth, have for disposal a complete electric light generating plant now in use at the Haven Hotel, Bournemouth. (See our advertisement pages to-day.)

**Merchandise Marks.**—The Merchandise Marks (Imported Goods) Bill has been printed and copies can be obtained at H.M. Stationery Office. It provides for the constitution of standing committees which will consider and report from time to time whether goods shall be required to bear an indication of origin at the time of importation and if an Order in Council ought to be made, and will recommend in what form and manner the indication of origin should be applied to the goods. An Order in Council may provide that imported goods so specified, if they cannot bear a mark of origin, shall not be sold or exposed for sale in the United Kingdom unless they are distinguished from similar goods of United Kingdom manufacture by some form of distinctive colouring or other variation in their make-up.

**Swiss Foreign Electrical Trade.**—An article upon Swiss foreign trade during 1925, from the British Legation at Berne, appeared in the *Board of Trade Journal* for March 4th. In this it is stated that the increase in the German Customs tariffs affected a number of important Swiss industries, including electrical apparatus, although the burden was somewhat lightened by a provisional agreement signed in December last. Negotiations are proceeding for a definite commercial treaty between Switzerland and Germany. The imports of apparatus during 1925 comprised electrical material, automatic telephones, and radio sets. Large purchases of vacuum cleaners were also made. The exports of dynamo-electric machinery rose from 6,222 tons to 7,558 tons, continuing a steady upward trend.

**New Jugo-Slavian Insulator Works.**—The *Gazette de Prague* states that a Jugo-Slav company has been granted permission to construct in Jugo-Slavia a factory for the production of porcelain insulators. The national administrations of Jugo Slavia themselves absorb every year porcelain insulators to a large value. Moreover, the requirements of the Jugo-Slav market are bound to increase since the Government proposes actively to push forward the extension of the national telephone and telegraph systems. It appears that Germany is interested in the establishment of this factory.—*Reuter's Trade Service* (Prague).

**Australian Tariffs.**—The Sydney correspondent of *The Times* reports that the Prime Minister, Mr. Bruce, in reply to inquiries concerning the working of the Tariff Board, the appointment of which was announced last September (when the new Tariff Act was passed by the Federal Parliament), says that the work of the Board has been proceeding for many weeks. Some British manufacturers wanted a three months' adjournment of the Board, in order to consider the proposed increased duties. This period Mr. Bruce considered excessive, but he was prepared to grant manufacturers a reasonable time in which to formulate their views as to the new duties.

**Book Notices.**—"Principles of Electric Power Transmission and Distribution," by L. F. Woodruff. Pp. v+340; pp. 110. London: Chapman & Hall, Ltd. Price 20s. net.

"Pitman's Electrical Educator."—Among the additional subjects to be found in parts 10 to 13 of this work are "Historical Development of the Dynamo," by W. Cramp, D.Sc.; "Heat and Heat Engines," by M. E. J. Gheury de Bray; and "Electrical Welding," by E. Arthur Atkins, M.I.Mech.E. The series of articles on the "History of the Electrical Industry" is continued.

"House Wiring." By George A. Willoughby, B.Sc. Pp. xi + 219, figs. 209. London: Chapman & Hall, Ltd. Price, 10s. net.—This book deals fully with the knob-and-tube systems of installation work practised in America and Canada, but not to any great extent in this country. The system is a modification of the porcelain cleat methods; the wires are suspended on knobs on cleats and run in porcelain tubes through the walls, &c. The various cables and accessories used under the system are fully described.

"The Turbine Pump: What it is and what it does."—This useful little booklet, issued by the Pulsometer Engineering Co., Ltd., deals in a novel way with the construction and operation of the turbine pump. The information is arranged in the form of questions and answers, into which some interesting technical problems of speed, power, &c., are introduced.

"Radio Press Year Book," 1926. Pp. xxxv+169; illustrated. London: Radio Press, Ltd. Price 1s. 6d. net.—The collection of useful data and articles by representative authorities in this work of reference will appeal alike to the beginner and the more advanced experimenter. In the valve section is to be found up-to-date information about the various types to employ for different purposes, in addition to a large selection of characteristic curves. The calculations portion of the book has been written in simple language to facilitate the design of coils and condensers and the calculation of resistance, &c.; valuable hints are to be found in the workshop section, and other features are lists of amateurs' call signs, wireless societies, &c.

"Year Book and Directory of the South African Mining and Engineering Journal for 1926." London: Argus South African Newspapers, Ltd. Price 10s. 6d.; postage 1s. 6d. extra.

"The Red Club," by H. R. Taunton. Pp. 282. London: Hurst & Blackett. Price 7s. 6d. net.

**Conditions in the Austrian Engineering Industry.**—No change has taken place in the situation of the Austrian engineering works. German and Czecho-Slovak competition has been extremely keen in export business, but the commercial treaties concluded have been of special benefit to this branch of industrial production. The electrical industry is also in a very favourable situation. The "strong current" section in the first place has received a great impetus from the development of Austrian water power, the electrification of Austrian railways and the extension of the telephone system, although the capacity of the industry does not yet appear to be fully utilised. In the "weak current" industry production conditions are less favourable, principally owing to the fact that export business leaves much to be desired.—*Reuter's Trade Service* (Essen).

**A Bootle Wiring Contract: Disclaimer.**—Messrs. James Scott & Co., Knowsley Electrical Works, Brasenose Road, Bootle, ask us to state, in order to prevent confusion, that they are in no way connected with the Knowsley Electrical Co., Ltd., the contractors for the electrical installation at the Cleaver Sanatorium, Heswall, of the West Derby Board of Guardians.

A committee of the Guardians which investigated the matter of the contract recommended the Board to "place on record their disgust that cable and tubing inferior to quality specified should have been so extensively and deliberately employed upon the job, and that the name of the Knowsley Electrical Co., Ltd., be entered in the record of unsatisfactory contractors." The company is to make full replacements of the material referred to. In the course of a discussion by the Board of Guardians, Mr. James Maguire, vice-chairman of the Engineering Committee, who discovered the discrepancies, said that the material put in only cost £5 10s. per 1,000 yards, whereas that stipulated for in the contract was priced at £12 3s. It was a disgrace and a danger to put in tubing which resembled salmon tins. By 28 votes to 22 it was resolved to apply to the Ministry of Health for a judicial inquiry to be held into the contract

The contract was for the installation of electric lighting, telephones, motors, wiring, &c., at the Cleaver Sanatorium at £1,098 2s., and the tender was the lowest of nine received. The order was given out on September 10th, 1925. On January 8th, 1926, the architect wrote to the contractors condemning all non-association cable and requiring re-wiring with cable as per contract. The contractors replied undertaking to carry out the architect's requirements. A detailed report of the whole matter will be found in the *Bootle Times* for March 5th.

**New Municipal Showroom.** — The Lincoln City Council has decided to erect a new showroom for the Electricity Department.

**Local Exhibitions.**—BACUP.—At a meeting of the Town Council, on March 4th, Councillor J. Ireland, J.P., chairman of the Electricity Committee, stated that the recent Electrical Exhibition had been productive of good, the direct result being a much larger demand for current. So rapid had been the progress made that an extension of mains and services had had to be considered and provision made for the expenditure of £13,000 on this work alone during the next two or three years.

BRADFORD.—An Ideal Homes Exhibition at Belle Vue Drill Hall, Bradford, was opened on March 3rd by Alderman Wilfred Turner (Deputy Lord Mayor). The Bradford Corporation electricity department had three attractive stands, at which daily demonstrations were given in electric cooking, washing, ironing, and cleaning.

**Municipal Trading in Australia.**—Parallel with the campaign which is being carried on in this country against electrical trading by municipal authorities, there is a similar movement afoot in Australia. The Sydney City Council recently decided to open showrooms for the exhibition and sale of electrical appliances The Electrical Employers' Association has issued a pronouncement against this, characterising the Council's action as a gross act of repudiation of the recently-formed Electrical Development Association of New South Wales, whose formation was encouraged and assisted by the Council. The Association was formed by the electrical traders, principally, and financed by them to conduct a big educational campaign on behalf of electrical development and guarantees of £9,000 per annum for three years were obtained; the City Council agreed to contribute a sum not exceeding £4,000 per annum and the City Electrical Engineer (Mr. Forbes Mackay) was one of the first executive members. Then, it is said, the Council suddenly discovered that it had no legal power to allocate funds to the Association, and finally decided to drop the scheme and instead become a trading institution itself. No explanation was received in reply to the Electrical Employers' Association's protest. Thus the Council has become a direct competitor with every retailer within a 15-mile radius from the centre of the city, and "proposes to jeopardise the livelihood of men who have spent half their lives building up businesses; who have done their utmost to help the city sell electric current, and who have expressed themselves willing to combine their own interests with those of the Council to the extent of spending some thousands of pounds per year in increasing the use of the Council's current." It is stated that politically-controlled state and municipal enterprises are "almost invariably" inefficient and the announcement quotes the case of the London boroughs as examples of the bad results of municipal electrical trading (before the war), saying that Battersea, Bermondsey, Fulham, Southwark and Woolwich all made heavy losses. Another statement made is that "the average rates in the pound of the 14 Metropolitan boroughs not trading in electrical supplies were approximately, on an average, tenpence in the pound (equal to nearly £750,000) less than those of fourteen boroughs dealing in electrical supply. From this, it is obvious that when municipal trading fails, the burden of the loss falls on the whole of the ratepayers; when private enterprise fails, nobody suffers but the trader." The Association, in conclusion, calls upon trade organisations and ratepayers to "voice an emphatic protest."

**The German Insulated Wire Industry.**—Since the end of November, it is stated, business in the insulated wire industry in Germany has been almost at a standstill. Usually the season lasts from October to March, but for the past two months the demand has considerably declined. A number of Rhenish works has already been compelled to introduce restrictions in working and discharge workmen. Most producers, however, are less affected by the crisis as the manufacture of insulated wires only forms a small part of their output. The unfavourable course of business is attributed chiefly to the slackness in building operations and the scarcity of capital on the part of the installation firms; and a revival in the demand is scarcely expected from the recent reduction of 10 per cent. in prices.

**English Plant for British Columbia.**—The British Trade Commissioner at Vancouver (Mr. L. B. Beale) informs the Department of Overseas Trade that the laboratories of the mechanical and electrical engineering departments of the University of British Columbia, under the administration of Dean R. W. Brock, Faculty of Applied Science, and Dr. H. Vickers, Professor of Electrical and Mechanical Engineering, are now nearing completion with regard to equipment. It is interesting to note that practically all the equipment thus far installed is of British make. The following items, all of British manufacture, have already been installed, or are on order for installation:—A 50-b.h.p. Diesel engine, a 50-b.h.p. Froude brake, a 10-kW De Laval steam turbine and dynamo, a 12-h.p. "National" gas engine, an 11-h.p. "Crossley" oil engine, a 3-ton refrigerating plant, a 250-kVA alternator, a 250-b.h.p. compound engine in the power house, a 50-h.p. marine engine, two d.c. level-compound generators, a 3-phase rotary converter with transformer and starter, an induction motor, an oscillograph, an a.c. potentiometer, a d.c. potentiometer, galvanometers, condensers, resistances and other standard equipment, electrostatic voltmeters, four transformers, iron testing equipment, a 350-Ah, 220-V storage battery, a h.p. switch panel, instruments and current transformers, samples of cables, &c. A large number of British text books replacing American text books have also been purchased.

**A Finger in the Pie.**—Under the heading, "Just cut yourself a piece of pie—there's plenty left," *Electrical Merchandising* depicts a number of pies, each of which represents a class of electrical appliances. Out of each of these pies a wedge has been taken showing the proportion of wired homes which have been equipped with the appliance in question. Over each pie in large red figures is stated the proportion of these homes still without the appliance named For instance, it is shown that the electric iron "pie" has been consumed to the extent of 71 per cent., leaving only 29 per cent. available. On the other hand, hardly any inroad has been made in the case of refrigerators and dishwashers, ½ and ¾ per cent., respectively. It is surprising to learn that only 3 per cent. of the wired homes have electric ranges—although this means that there are about 435,000 in use. Heaters are in use to the extent of 10 per cent.; washers represent 21 per cent.; fans, 19 per cent.; percolators, 13 per cent.; vacuum cleaners, 31 per cent.; and toasters, 23 per cent.

**Public Lighting Exhibition.**—In connection with the annual meeting and conference of the Institution of Public Lighting Engineers at Newcastle-on-Tyne, it is proposed to hold an exhibition of up-to-date lighting appliances (both gas and electrical) from September 14th to 16th. Firms desirous of exhibiting should apply at once to Mr. R. Davison (President-elect), Public Lighting Superintendent, Corporation Lighting Department, Blagdon Street, Newcastle-upon-Tyne, stating the amount of space required and if electricity or gas will be needed in connection with their exhibits.

**New French Companies.**—Among the new companies recently formed in France are the Société d'Electricité de Danze, organised at Danze (Loire et Cher Department) with a capital of 100,000 fr., to establish an electricity distribution system in the town, and the Société de Regularisation des Forces Motrices de la Ville de Romanche formed in Grenoble with a capital of six million francs to establish another hydro-electric station on the River Romanche at Chambon (Isère).

**Austrian Loan in Switzerland.**—The A.E.G.-Union Electricitats Gesellschaft is reported to have concluded arrangements with a Swiss bank for the floating of a loan of seven million Swiss francs (about £280,000), repayable in 25 years.

**A Swedish Company's Report.**—The directors of the Allmanna Svenska Elektriska A.B. have now issued their report for 1925, which, as was mentioned previously, shows larger net profits and an increase in the rate of the dividend from 2½ per cent. in 1924 to 4 per cent. last year. According to the report, the turnover, both in the home and export markets, experienced an augmentation, although no improvement took place in prices. It was possible to reduce the costs of production as a result of the introduction of improvements in construction and simplifying the methods of working. Extensions of the workshops were carried out in order to meet the demand for still larger generators for hydro-electric works, and these additions, it is stated, will permit the company to produce such sizes of machines as are likely to be required for some years. The laboratory at Vasteras was transferred to more appropriate premises, and was provided with modern equipment. The stock of orders on hand at the end of 1925 was somewhat greater than the corresponding figures a year ago. Among the orders carried out during the year the report mentions the delivery of 43 out of the 50 electric locomotives ordered for the Stockholm-Gothenburg railway, besides motor generators and instruments for the transformer stations. The turnover in the mechanical department also showed an increase. At the end of 1925 the number of persons employed at the works and offices in Sweden was 6,403. The share capital amounts to 75,000,000 kr., and the financial position of the company is stated to have improved during the year.

**Chinese Notes.**—It is reported that the Chinese Eastern Railway has decided to install 13 power stations in towns upon its system during the next three years. The cost of the entire scheme is estimated at $469,000. In the first year stations will be erected at Anta and Suifeng.

Four companies are now operating electric lighting plants in Pinghu, Chekiang province, *viz.*:—The Ming Hwa Electric Light Co., the Sheng Chia Co., the Chapoo Co., and the Hsin Chi Co.

Long-distance telephone services have been commenced between Kweihwa, Sunyuanhsien, Paotowchen, and Wuyuan; and between Shanghai and Wusih, Kiangsu Province.

The Wuchow Electric Power Co. (Kwangsi Province), hitherto a private concern, has become a joint Government and private enterprise. A sum of $500,000 has been voted for the capital of the company from provincial funds.

**Spanish Duty on Radio Valves.**—Radio valves which, for import duty purposes, were formerly embodied in the section "incandescent electric bulbs," have now been given a separate heading in the Spanish Customs tariff. The duty is to be 156 pesetas (gold) per kg. net under the first tariff and 52 pesetas under the second.

**A Czecho-Slovakian Amalgamation.**—An amalgamation of the businesses of Siemens & Co., of Pressburg, and the Muglitzer Electricitäts Gesellschaft, of Muglitz, has recently been effected. The Pressburg works are to be devoted to the production of large electrical plant and those at Muglitz to small dynamos and motors and electrical apparatus.

**The Rumanian Electrical Industry.**—The Mid-February "Review of Central Europe," issued by the Anglo-Austrian Bank, Ltd., states that a number of Rumanian industries found it difficult to obtain funds during 1925 and had to have recourse to the National Credit Institution. Among these was the electrical industry, which applied for a grant of 244 million lei and received 101 millions.

**New Portuguese Import Duties.**—The *Diario do Governo* for January 27th contains a decree which raises a new heading in the Portuguese Customs Tariff for "complete installations for telephone exchanges," the duties being 3 centavos per kg. under the "maximum" tariff, and 1 centavo per kg. under the "minimum" tariff. This new heading is not regarded as covering accumulators, dynamos, or motors and their respective switchboards.—*Board of Trade Journal.*

**Employment, Wages, and the Cost of Living.**—A special supplement was issued with the February *Ministry of Labour Gazette* containing graphic details of wages in Great Britain and Northern Ireland, 1920-25; the comparative levels of real wages in the leading industrial countries; the aggregate duration of industrial disputes from 1900 to 1925; changes in food prices and cost of living, 1900-1925; unemployment from 1900 to 1925; a comparison of international unemployment, 1920-25; trade union membership, 1900-1925, &c. Each curve and diagram is of absorbing interest to the student of economic affairs, and the method of presentation causes many salient facts to become apparent at a glance. It is seen, for instance, that, gauged by the percentage of trade union members out of work, unemployment in 1924 fell below the 1908 level and was not a great deal higher in 1925. This same curve also illustrates the operation of the trade cycle, although the war period caused abnormal developments. The curves illustrating international unemployment show, generally speaking, a common tendency in each year; also that Great Britain was not afflicted with such violent fluctuations as a number of other nations. The "real wages" diagram (as at October 1st, 1925) shows that superior conditions existed in Philadelphia, Ottawa and Sydney. London and Oslo were about level. Real wages in Berlin were higher than in five other Continental capitals, the lowest being Lisbon. Paris, for some reason, is not included. The first curve shows that wages in Great Britain and Northern Ireland have remained practically unchanged, in the aggregate, for the past three years after a steep descent from the 1920 level.

**Copper, Lead, and Rubber Prices.**—Messrs. F. Smith and Co. and Messrs. James & Shakespeare report, March 9th: No change in copper prices.

Messrs. James & Shakespeare report, March 9th: English pig lead, £33, 10s. dec.

Messrs. Edward Till & Co. report, March 9th: India rubber, Para fine, 2s. 1½d., 2½d. dec.

**Swiss Glow Lamp Prices.**—The glow lamp factories in Switzerland, which stand in a syndicate relationship with the other makers in Europe and the United States, brought into operation on February 9th a new list of prices, showing increases in some cases. Under the new regulation, lamps of low pressure (110 volts) have been placed on the same level as those for 220 volts.

**Fire.**—A fire occurred last week at the Anaconda Works, Salford, of Messrs. Frederick Smith & Co., wire manufacturers, and considerable damage was caused.

**Vienna Telephone Cable Contracts.**—Orders for the extension of the Budapest-Vienna telephone cable are reported to have been placed with a syndicate composed of the Felten and Guilleaume Company, the Siemens-Schuckert Company, and the Ver. Gluhlampenfabrik.

## Lighting and Power Notes.

**Accrington.**—New Sub-Stations.—The Corporation Electricity Committee is considering the erection of three sub-stations.

Loan.—Application is being made for sanction to borrow £50,000 for mains required during the next four years.

**Barking Town.**—Loans.—Application is being made by the Electricity Committee for sanction to loans of £1,500 for mains extensions, and £2,250 for a l.p. feeder.

**Bath.**—Mains Extensions.—The Electric Lighting Committee has recommended the Town Council to extend the mains to Batheaston, Bathampton, and Bathford, at an estimated cost of £28,965.

**Beckenham.**—Electricity Extensions.—The Electricity Committee has prepared a scheme for the extension of h.p. feeders at a cost of £32,000.

Loan Sanctioned.—The Committee has received sanction to a loan of £10,000 for mains and services.

**Birmingham.**—Loans Sanctioned.—The Electricity Committee has obtained sanction to the borrowing of £11,000 for building alterations, £20,480 for cooling towers, £14,000 for plant, and £24,500 for sub-stations.

**Blackpool.**—Loan Sanctioned.—The Corporation has received sanction to the borrowing of £49,000 for mains and services.

**Bolton.**—New Plant.—The Electricity Committee has decided, on the recommendation of the borough electrical engineer, to install two additional boilers, complete with economisers, stokers, and accessory plant, at Back-o'-the-Bank station.

Electricity Extensions.—The Electricity Committee has decided to strengthen the e.h.p. cable system at a cost of £21,000, to provide additional switchgear at Spa Road sub-station at a cost of £9,000, and to install additional transforming plant at a cost of £4,300.

**Bridport.**—Electricity Scheme.—The Town Council proposes to introduce an electricity supply for the town, and application is being made for an Order to proceed with the scheme. The capital cost of the plant is estimated at £14,000, and a further sum of £800 will be required for the laying of a cable for the lighting of about 100 street lamps. It is estimated that at the end of three years further plant costing £3,000 will be required. The proposed charges for electricity are 10d. per kWh for lighting and 3d. per kWh for power. Mr. T. Hood, of Bristol, has been engaged as engineer to carry out the scheme.

**Continental.**—Portugal.—According to the annual report of the British Chamber of Commerce in Portugal, the water power available in the country amounts to 500,000 h.p., of which only 16,000 h.p. is utilised at present.

Belgium.—Of a total of 345 communes in the province of Brabant, 237 are now supplied with electricity. With regard to the remaining 108 communes, as the work of providing a distribution system is not sufficiently attractive to private enterprise, it is to be undertaken by the provincial authorities, who have provided a sum of 500,000 fr. for the purpose in their 1926 Budget.

France.—La Société des Forces Motrices du Vercors has secured a concession to establish a hydro-electric station to utilise two waterfalls on the river Lyonne, in the Department of Drome.

Germany.—A feature of the extension of the electricity distribution in the Rheinland district of Germany is the increasing use of lignite as the fuel for the boilers. It is reported that out of 1,797 million kWh supplied in the district in 1921, 40 per cent. was generated by coal, 49 per cent. by lignite, 9.5 per cent. by gas, and 1.5 per cent. by water. Last year the output amounted to 2,462 million kWh, and of this the proportion generated by lignite had increased to 54.7 per cent., while coal-using stations had dropped to 30.5 per cent. Those using gas as fuel had increased to 13.8 per cent., and hydro-electric stations to 2 per cent. The principal power stations in the area using lignite as fuel are the Goldenberg, the Fortuna I (40,000 kW), and the Fortuna II (80,000 kW).

**Chile.**—Valparaiso.—The Municipality of Valparaiso is considering a project for a new water supply system, which will also include plans for a hydro-electric plant to furnish an electricity supply to the towns along the route of an aqueduct leading from the Andean mountains to the city. Several favourable sites for the erection of the hydro-electric generating station have been found, and it is anticipated that approximately 40,000 kW will be available.—*Reuter's Trade Service* (Valparaiso).

**Dereham.**—Inquiry.—An inquiry into the application of the Urban District Council for authority to distribute electricity in its area was held by Mr. J. A. Lee, of the Electricity Commission, on February 25th. Mr. W. R. May, electrical engineer to Lowestoft Corporation, in outlining the scheme, said the estimated capital expenditure was £7,600, and the revenue was estimated at £1,350 per annum with working costs at £900. Mr. W. R. Long, Norwich city electrical engineer, said his Corporation proposed to carry its supply as far as Wymondham, and the capital charge for extending the main to Dereham would be approximately £600 per annum. The charge per kW would not exceed £5, and the "unit" charge would be about ¾d. Objections were raised by agricultural owners and occupiers on the ground that the scheme would be a burden upon the rates. The Commissioners will give their decision in due course.

**Irish Free State.**—Limerick.—At a recent meeting of the Electric Lighting Committee, the report of the electrical engineer on the subject of the proposed extension of the electric lighting scheme was considered, and it was decided to adjourn the question pending a further report on the matter. The estimated cost of the extension is £20,000.

**Liverpool.**—Loans.—The Electric Power and Lighting Committee is making application for sanction to the borrowing of the following sums for the provision of mains and services for the supply of electricity to houses in course of erection:—Walton-Clubmoor Housing Estate, £7,800; Knotty Ash Housing Estate, £6,052. Extensions of h.p. mains are to be carried out at an estimated cost of £600, and the equipment of a sub-station at a cost of £2,000 in connection with the Mersey tunnel works.

**London.** — Southwark.—*Electricity Supply.*—The Electricity Committee has recommended a scheme of extensions in preference to arranging for a bulk supply, and is making representation to the Electricity Commissioners accordingly.

**Manchester.**—PROGRESS DURING JANUARY.—During the month of January, the Corporation electricity undertaking showed an increase in connections of 2,114 kW, bringing the total to 277,320 kW; and the number of applications received for supply, including existing consumers for additional supplies, was 811, representing a total of 1,645 kW. The number of hired cookers connected increased by 54, bringing the total actually on circuit to 1,307. Applications for the hire of cookers totalled 71. 500-kVA transformers were put into commission at the Lumb Mill, Droylsden, and Burnage sub-stations, one of 250-kVA at Messrs. J. Hetherington & Sons' Works, and one of 100-kVA at Droylsden.

LOAN SANCTIONED.—The Electricity Committee has received sanction to a loan of £120,000 for sub-station equipment.

**Mansfield.**—COMMITTEE OF INQUIRY.—As briefly reported in our last issue, a special committee has been appointed "to make a full investigation into the affairs of the electricity undertaking." During a debate upon the matter at a meeting of the Town Council, as reported in the *Mansfield and North Notts. Advertiser*, a number of matters were mentioned. The department was criticised for an alleged delay in the opening of a new showroom; for changing over to a bulk supply and "scrapping" the generating plant; for laying cables which had lain idle for a long period; for the high price of energy; and for the low voltage in a certain district. One of the major criticisms related to contracts for the laying of cables. It was stated that a company had charged 4s. a yard for laying cables for a period of 10 years. Upon a recent occasion tenders were invited and one was accepted for 1s. 10½d. per yard. The mover of the resolution considered that the disparity between the prices should be investigated.

**Moray.**—ELECTRICITY SUPPLY.—The exclusion of the North of Scotland from the Government's electricity scheme was recently discussed by the County Council, and it was decided to join Banff and Inverness in pressing for the extension of an electricity supply to the area north of Aberdeen.

**Palestine.**—RUTENBERG CONCESSION.—According to the Jerusalem correspondent of the *Daily Express*, the five years' negotiations over the Rutenberg scheme were completed on March 5th, when Lord Plumer, the High Commissioner, signed a £2,000,000 concession for the utilisation of the 600-ft. waterfall on the River Jordan for the generation of electricity and the irrigation of the Jordan basin. The original agreement, which was concluded in 1921, expired in 1923. Mr. Rutenberg then began negotiations with the Colonial Office and the High Commissioner for the renewal of the agreement. This has involved important changes, including the extension of the concessionnaire's rights in Transjordania.

**Price Reductions.**—Reductions in the charges for electricity have been made or recommended in the following districts:—

LONDON.—*St. James' & Pall Mall Electric Light Co., Ltd.*—Lighting: First 4,000 kWh per annum, 5d. per kWh; all energy in excess of this amount, 4d. per kWh; minimum charge of 10s. per quarter. Power: A fixed quarterly charge of 7s. 6d. per rated h.p. and 1d. per kWh for electricity consumed. Heating: 1d. per kWh.

REIGATE.—Lighting: From 7d. to 6½d. per kWh. Power, heating and cooking: From 2½d. to 2d. per kWh.

CARLISLE.—The percentage increase on the pre-war rates for lighting from 60 to 45 per cent.

WINCHESTER.—Cooking, heating, and other domestic purposes during the spring and summer months: From 1¼d. to 1d. per kWh.

**Ripon.**—ELECTRICITY SUPPLY.—At a recent meeting of the Electricity Committee a letter was received from the Electrical Distribution of Yorkshire, Ltd., stating that it proposed applying for a Special Order authorising it to distribute electricity in Ripon in conjunction with a scheme for the supply of electricity in neighbouring districts. The Committee decided to recommend the Corporation to proceed forthwith with an application for an Order empowering the Corporation (or any undertakers to whom it may lease such powers) to supply and distribute electricity within the city and adjoining parishes.

**Sheffield.**—MAINS EXTENSIONS.—The Electric Supply Committee has during the past month approved extensions of mains for general distribution purposes, at an estimated cost of £22,518.

**South Africa.**—LINKING-UP SCHEME.—The *African World* reports that the Cape, Durban, and Rand electricity supply systems will be the starting points for a system of interconnected power stations throughout South Africa. According to Dr. Van der Bijl, chairman of the Electricity Supply Commission, important developments are projected for supplying power to the Valley as far as Worcester, and large extensions are contemplated for Durban which will ultimately link up with the Colenso power station.

**South Kirkby.**—ELECTRICITY SCHEME.—The Carlton Main Colliery Co. is preparing a scheme for supplying South Kirkby with electricity, and is considering the possibility of furnishing a supply to the parishes of Great Houghton and Shafton.

**Special Orders.**—Application has been made to the Electricity Commissioners for Special Orders by the following authorities:—The Auckland Rural District Council for the supply of electricity in the township of Witton-le-Wear, and authorising the Council to purchase electricity in bulk; Stepney Borough Council for the purchase of land and the erection of a transformer station; the Yarmouth (Isle of Wight) Electricity Supply Co., Ltd., for the supply of electricity in certain parts of the rural district of the Isle of Wight.

**Stockton-on-Tees.**—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £5,000 for installing electricity in private houses on the instalment system.

**Stoke.**—ELECTRICITY EXTENSIONS.—The Electricity Committee has decided to lay a main at a cost of £1,000 in connection with the supply of electricity to the new telephone exchange in Scotia Road, Burslem.

The electrical engineer has reported upon additions to the distributing system which will be necessary to maintain a satisfactory supply to Tunstall, and has submitted a scheme involving an expenditure of £9,500. A site has been obtained in the Tunstall area for the erection of a sub-station. The committee has obtained sanction to a loan of £11,500 for mains and sub-station equipment.

**United States.**—ELECTRICAL DEVELOPMENT.—According to *Power*, the total annual output of electricity by public-utility power plants in 1925 was 65,801,000,000 kWh, an increase of 11.5 per cent. over the output for 1924. Of this quantity, about 34 per cent. was produced by the use of water power, a slight increase over the percentage for 1924. The gain in efficiency in the use of fuel continued in 1925, there being a decrease of about 0.1 lb. in the average consumption of coal per kWh, as compared with the rate of 1924.

**West Ham.**—ELECTRICITY IN BULK.—The Town Council has applied for a Special Order authorising it to supply electricity in bulk to East Ham and Ilford.

**Worcester.**—ELECTRICITY EXTENSIONS.—The Corporation Electricity Committee has recommended to the Council that the following works be carried out:—Sub-station in Queen Street, £2,500. Foundations, platforms, alterations and extensions to the circulating water piping and cable work in connection with the turbo-alternator, £4,742. Excavations and building work for the completion of boilers, dampers, steel chimney, steam pipes, and pulverised fuel milling plant, £13,000.

**York.**—LOAN SANCTIONED.—The Electricity Committee has received sanction to a loan of £15,000 for feeder cables.

## Tramway and Railway Notes.

**Continental.**—FRANCE.—Plans have been prepared for the electrification of the steam-operated local lines of the Société des Voies Ferrées des Landes (about 200 miles), and of the Compagnie des Tramways à Vapeur de la Chalosse et du Bearn (about 90 miles) in the Department of Landes. It is proposed that a rural electricity supply system shall be included in the scheme and to this end that the masts carrying the 1,500-V line for railway traction purposes shall also carry a 10,000 or 20,000-V three-phase line to feed transformer sub-stations in the various communes on the route traversed.

BELGIUM.—The 1926 Budget of the Belgian Ministry of Railways and Electricity includes a sum of 1,200,000 fr. for the installation of electric lighting in the German railway carriages running on the Belgian State railways and a sum of 14 million fr. for the extension of the electric lighting and power installations at all the principal railway stations on the system.

PORTUGAL.—A concession has been granted by the Municipality of Lisbon to a group of Spanish financiers for the construction of a metropolitan underground railway, the plans for which have been drawn up by Spanish engineers. The enterprise includes the construction of eight lines. Vignole rails, 18 metres in length, will be used, and the lines will have a gauge of 1.44 metres. The total cost of the scheme is estimated at 128,000,000 pesetas.—*Reuter's Trade Service* (Lisbon).

SWITZERLAND.—The first section of the Lausanne-Berne railway to be electrified is that between Lausanne and Palezieux, on which electric trains are now running. The necessary power is being supplied from the Puidoux transformer station where two 5,000-kVA, 60,000/15,000-V transformers are installed.

BAVARIA.—According to *Modern Transport* the Munich administration of the Reichs Railways has issued the details relative to the electrification of the railways in Bavaria. The following lines were completed and included in the electrical service during 1925: Munich-Garmisch, Tutzing-Kochel, Munich-Herrsching; Weilheim-Peissenberg, and Munich-Landshut, increasing the system under electrification by 172½ miles. It is proposed during the present year to finish the work on the Landshut-Regensburg line and push forward the conversion of the Munich-Kufstein track in order that a portion may be working before the end of the year.

**Huddersfield.**—Omnibus Dispute.—There has been a dispute between the Corporation, on behalf of the borough tramways and a motor 'bus company, with regard to rights of running passenger motor 'buses on the Bradley, Ravensthorpe and Dewsbury route, and an inquiry into the respective applications for running powers was held by the Ministry of Transport recently. The Corporation claimed exclusive rights, but the Ministry has now intimated that both concerns have equal rights, and an Order has been made accordingly.

**Irish Free State.**—Dublin.—A proposal has been made that when the extension of the Dublin United (Electric) Tramway Co.'s lines to Lucan is commenced, a clause should be included in the Parliamentary Act for extension to Leixlip. This would give a direct route to the central portion of Dublin, covering, in the main, the route of the old Lucan-Dublin Electric Railway recently closed down. The proposal has been supported by a memorial to the Tramways Company from the inhabitants of the Leixlip district. Meantime the Extension Bill is being delayed by the attitude of some of the Dublin townships which have not given their consent to the extension of the period of optional purchase by public authorities of the tramway system as arranged between the company and the City Commissioners.

**London.**—Waterloo Station Reconstruction.—In view of the heavy traffic which will have to be dealt with at Waterloo tube station in the future, considerable improvements are to be made to provide for the free and rapid movement of the traffic. Contracts have been placed, and work is now in hand. Three escalators of the comb type will supplement the existing lifts. The work at the lower landing of the escalators will include the construction of new footbridges, passages and staircases leading to the new Waterloo station of the Hampstead railway, and connections to the existing passages leading to the Waterloo station of the Bakerloo railway. At the upper level of the escalators there will be a booking hall 52 ft. wide which will be provided with passimeters.

**Nottingham.**—New Depot.—The Town Council has approved a scheme for the erection of a new central depôt in the Cartergate area for the accommodation of tramcars, 'buses, railless cars, offices, &c., at a cost of approximately £102,000.

**Preston.**—Tramway Renewals.—The Tramways Committee has recommended to the Town Council the renewal of permanent way at a cost of £4,900, and tramcar renewals at a cost of £3,920.

**Sunderland.**—Tramway Improvements.—The Corporation is to construct new tramway crossings at the north end of the railway station, and lay a new junction from High Street into Bridge Street, at an estimated cost of £4,500.

**Uruguay.**—Montevideo.—According to the *Bank of London and South America Monthly Review* there is a scheme on foot to electrify the railway running from Montevideo to the village of Santiago, Vazquez, and preliminary trials have been made, in conjunction with the Compañia de Tranvias La Transatlántica.

**Worcester.**—Purchase of Undertaking.—A sub-committee has recommended to the City Council that, subject to the approval of the Ministry of Transport, the tramway undertaking of the Worcester Electric Traction Co., Ltd., shall be purchased at a cost of £58,000.

## Telegraph and Telephone Notes.

**China.**—Telephone Agreement.—According to the Shanghai British Chamber of Commerce *Journal*, an agreement has been concluded with the Chinese Government Telephone Administration and the Shanghai Mutual Telephone Co., Ltd., for intercommunication between their respective subscribers.

**Hull Telephone Service.**—New Sub-station.—The Municipal Telephone Committee has acquired a site in Somerset Road, for the erection of a sub-station.

**The Telephone Service.**—Street Kiosks.—The erection in London streets of a new type of telephone kiosk is, the Press Association learns, under consideration by the G.P.O. The kiosks are to be a little bigger than the present type, and will include a pillar-box and stamp machine.

**Mexico.**—Telegraph Service.—The Western Union Telegraph Co. announces that its vice-president, Mr. J. C. Willver, who is in Mexico City, has concluded a contract with the Mexican Government for the introduction of a modern telegraph service in Mexico. According to the *Financial News*, this will mean the ending of the monopolistic system and the opening of a way for other companies. The service will be extended southward through "all America cables." The agreement is subject to the approval of Senor Calles and the boards of the Western Union and Mexican companies.

**Transatlantic Telephony.**—Two-way Demonstration.—On Sunday afternoon, March 7th, the Post Office Engineering Department successfully demonstrated the possibility of two-way radio-telephony across the Atlantic Ocean, when Press representatives in London and New York were given an opportunity of conversing with each other. By means of a repeater installed within the London Telephone Trunk Exchange the voice is conveyed by land lines to the radio transmitting station at Rugby, whence it is wirelessed across the Atlantic to a receiving station at Houlton, 600 miles distant from New York; thence by land lines it passes through repeater stations to New York City's telephone terminal. The return transmission from America is *via* land lines to Rocky Point, Long Island, 70 miles from New York, then by radio across the ocean to the Wroughton receiving station, near Swindon, and thence by ordinary telephone circuit over 90 miles to London. The wave-length used from this side is 5,770 metres, that from America is 5,260 metres, and the power used at each end is about 200 kW.

## Radio Notes.

**Broadcasting Committee.**—Cabinet Consideration.—The report of the Broadcasting Committee, which is summarised elsewhere in this issue and is now under the consideration of the Postmaster-General, will be brought before the Cabinet immediately with a view to deciding whether legislation should be introduced to give effect to its recommendations. It appears that the new method of controlling broadcasting advocated by the committee has already been accepted by the Government in principle, but while the view has been advanced in some quarters that the new Board of Control could be set up without recourse to a Parliamentary Bill, it is stated in the *Daily Mail* that that view is not shared by Ministers.

**Copyright.**—B.B.C. Injunction.—The B.B.C., as owners of the copyright of the *Radio Times*, were, on March 4th, in the Chancery Court, granted an injunction, with costs, against the Wireless League Gazette Publishing Co., Ltd., restraining it from publishing wireless programmes taken from the *Radio Times*.

**Storm Damage.**—Service Interrupted.—A return to winter weather, with high wind, snow, and lightning, was experienced last week. On March 3rd the Daventry station closed down for some minutes from 10.14 p.m., and on the 4th the London station's transmission was temporarily interrupted from 4.30 to 6.30 p.m. on account of the electrical storm. The fault is reported to have been located in the power line, and the old aerial at Marconi House had to be requisitioned for use during the remainder of the evening. The Manchester station also apparently closed down for a time.

**Wave-length.**—Readjustment.—On March 4th, the Dundee and Liverpool relay stations of the B.B.C. exchanged places in the broadcast wave band. The Dundee station is now working on 315 metres and Liverpool on 331. The effect of this change is to create a greater margin between the two adjacent Scottish stations, Edinburgh (328 metres) and Dundee; also to remove Liverpool farther from the shipping wave-length (300 metres).

## Contracts Open and Closed.

**(The date given in parentheses at the end of the paragraph indicates the issue of the "Electrical Review" in which the "Official Notice" appeared in our advertisement pages.)**

### Open.

**Argentina.**—Buenos Aires.—April 12th. Public Works Department. Rock drilling installation, including steam shovel, aerial transporters, 170-h.p. electric generating plant, &c.*

May 3rd. Electric travelling crane, capacity 1½ metric tons.*

**Australia.**—Brisbane.—August 27th. City Electric Light Co., Ltd. One 12,500-kW turbo-alternator and two water-tube boilers, with economisers, draught plant, &c. Specifications (£5 5s.) from the offices of the company, Boundary Street, Brisbane.

**Ayrshire, Kilmarnock.**—Ayrshire County Council. Electric lighting work in connection with the housing scheme. Mr. D. R. Sturrock, district clerk, Kilmarnock.

**Belfast.**—April 3rd. Electricity Department. One 1,000-kW rotary converter, with transformer, l.p., a.c. switchgear, &c. (See this issue.)

**Brazil.**—Rio Grande do Sul.—April 15th. Port and Bar Management. 10 electrically-operated portal cranes, capacity 2,500 kilos; 2 ditto, 5,000 kilos capacity; and 7 electric winches or capstans.*

**Cardiff.**—March 22nd. Electricity Department. Grit-collecting plant, 100-kW, 400-V alternator, &c. (March 5th.)

**Croydon.**—March 17th. Board of Guardians. Six months' supply of electrical fittings and sundries. Forms of tender from the Union Offices, Mayday Road, Thornton Heath.

**Dublin.**—Dublin City Commissioners. Wiring for electric lighting at 230 houses at Croydon Park and 218 houses at Kehoe Square. City Architect, Lord Edward Street, Dublin.
E.h.p. switchgear and accessories for Pigeon House and Fleet Street stations. City Electrical Engineer, Fleet Street, Dublin.

**East Ham.**—March 15th. Electric Lighting and Tramways Department. Cable, bifurcating boxes, and joint boxes. (February 26th.)

**Edinburgh.**—April 12th. Electricity Department. Four water-tube boilers, economisers, and mechanical stokers or alternatively, boilers, economisers, air heaters, and mechanical stokers or boilers, economisers and powdered fuel plant. (See this issue.)
Education Authority. Electrical work at additions to Balfour Place School. Mr. John Stewart, executive officer, Education Offices, Edinburgh.

**Egypt.**—CAIRO.—April 27th. Egyptian Government. 1,100 desk telephones. Chief Inspecting Engineer, Queen Anne's Chambers, Broadway, Westminster, S.W.1.—*Reuter's Trade Service* (Cairo).

**Galston.**—March 15th. Town Council. Electric lighting installation at 52 houses. Messrs. J. Hay & Steel, architects, Kilmarnock.

**Grimsby.**—March 29th. Electricity Department. One 2,000-kW converter, one 1,000-kW ditto, l.p. switchgear, cable work, &c. (March 5th.)

**Hull.**—March 18th. Electricity Department. Static transformers and motor converters. (March 5th.)
Telephones Committee. Supply of lead-covered cable and r.c. wire. (See this issue.)

**India.**—March 30th. India Store Department. Complete equipment for one rotary-converter sub-station, three separate rotary-converter sets and track sectioning switchgear for the G.I.P. Railway electrification. (February 26th.)
March 19th. Inert electric cells, "S" pattern. (March 5th.)
March 24th. 30-line automatic and 10-line manual telephone equipment. (See this issue.)
April 19th. Goods lifts for the Imperial Record Offices at Raisina, Delhi. (A.X. 2,904)*
April 2nd. Cable. (March 5th.)
April 23rd. Electrical equipment for 15 motor coaches and 42 trailer coaches. (March 5th.)
April 13th. 23 electric passenger locomotives. (February 26th.)
May 7th. 15 motor-coach underframes and bodies, 30 motor bogie trucks. (See this issue.)

**Kettering.**—March 23rd. Electricity Department. Transformers, e.h.p. and l.p. switchgear, one 1,500-kW rotary-converter equipment, and one steam turbo-boiler feed pump. (February 26th.)

**Leyton.**—April 9th. Education Committee. Installation of electric lighting and central heating at the Sybourn Street new school. (See this issue.)

**London.**—LONDON COUNTY COUNCIL.—March 23rd. Wiring and fittings for electric lighting at St. Paul's Road elementary school, Bow, E. (March 5th.)
BETHNAL GREEN.—March 16th. Board of Guardians. Installation of electric lighting in the office extension at Bishop's Road, N.E., and rewiring of the existing building. (March 5th.)
METROPOLITAN ASYLUMS BOARD.—March 24th. Installation of electric lighting at the Southern (Lower) Hospital, Dartford. (March 5th.)
ISLINGTON.—March 16th. St. Mary's Board of Guardians. Electrical supplies for six months. Forms of tender from Mr. A. King, Guardians' School, Hornsey Road, N.
March 29th. Borough Council. Two 3½-ton electric refuse-collecting vehicles fitted with steel tipping bodies. (See this issue.)

**Manchester.** — March 22nd. Electricity Department. 3-phase, 420-V sub-station switchgear, 3-phase, 6,600-V and 11,000-V ditto, three 500-kVA static transformers, and one 7,500-kVA forced-air-cooled transformer. (February 19th.)
March 22nd. One 5-ton electric tipping wagon and one 10-ton electric tractor with trailer. (February 26th.)
April 6th. 3-phase, 6,600-V, sub-station switchgear. (See this issue.)
Province of East Lancashire. Wiring, &c., Masonic Temple, Manchester. (See this issue.)

**Midlothian.**—March 15th. Education Authority. Electric light installation at extensions of Fisherrow School, Musselburgh. Mr. A. L. Fletcher, executive officer, County Education Offices, 9, Drumsheugh Gardens, Edinburgh.

**Mountain Ash.**—March 22nd. Electricity Department. Two 500-kVA transformers. (March 5th.)

**Newark-upon-Trent.**—March 16th. Electricity Department. Medium and l.p. switchgear and accessories. (February 26th.)

**Newcastle-on-Tyne.**—March 19th. Board of Guardians. Lighting installation and the installation of a lift at the nurses' home. Specifications from Messrs. Harrison & Ash, 22, Ellison Place, Newcastle-on-Tyne.

**Newcastle-under-Lyme.**—March 16th. Electricity Supply Department. 2,300 yd. single l.p. cable and 800 yd. single l.p. cable. (March 5th.)

**Otley.**—March 30th. Wharfedale Isolation Hospital Committee. Electrical installation at the Isolation Hospital, Menston. (March 5th.)

**Portsmouth.**—March 17th. Board of Guardians. Three months' supply of electrical stores and lamps. Forms of tender from the Guardians' Offices, St. Michael's Road, Portsmouth.
Electricity Supply Department. Erection of a steel-framed turbine house. (February 19th.)

**Preston.**—March 12th. Electricity Department. Steelwork in connection with foundations for a turbo-generator at Ribble power station. Specifications from Mr. J. A. Robertson, consulting engineer, 20, Brazennose Street, Manchester.

**Pentre, Rhondda.**—March 27th. Rhondda U.D.C. Electricity Department. 12 months' supply of house-service a.c. ordinary and prepayment meters, cable, joint boxes, compound, cut-outs, &c. (March 5th.)

**Rochdale.**—March 16th. Gas and Electricity Committee. One 1,250-kW (or alternatively 1,500-kW) rotary-converter equipment, including transformer and switchgear. (February 26th.)

**Roxburgh.**—March 15th. Electrician's work required in extension of Grammar School. Schedules from Messrs. Reid and Forbes, architects, 7, Ainslie Place, Edinburgh.

**South Africa.**—JOHANNESBURG.—April 12th. S.A. Railways and Harbours. Electrification of Cape Town Suburban Railway. Supply and erection of the overhead equipment of the permanent way and overhead transmission and distribution lines. (February 12th.)
May 6th. Two electric goods lifts.*

**Spain.**—The Junta de Obras of the Port of Tarragona invites tenders for the supply of two 3-ton electric cranes.—*Reuter's Trade Service* (Madrid).

**Sutton Coldfield.**—March 24th. Electricity Department. E.h.p. underground mains, distributors, feeder pillars, and network fuse boxes. (March 5th.)

**Tynemouth.** — March 15. Electricity Department. One 250-kVA transformer. (February 26th.)

**Walthamstow.**—March 24th. Electricity Department. 12 months' supply of l.p. cables and v.i.r. wires. (See this issue.)
April 13th. Electricity Department. Steel overhead bunkers and boiler-house buildings; and coal- and ash-conveying plant. (See this issue.)

**Warrington.**—March 15th. Electricity and Tramways Committee. Motors and transformers. (February 26th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Closed.

**Bath.**—Electric Lighting Committee. Recommended:—
Boiler and economiser (£5,963) and mechanical stoker (£1,502).—Babcock and Wilcox, Ltd.
Two sets of 1,000-kVA Scott-connected transformers and two 6,600/11,500-volt, three-phase transformers (£2,466).—Hackbridge Electric Construction Co., Ltd.
Economisers (£1,778).—Green & Sons.

**Blackpool.**—Tramways Committee. Accepted:—
Supply of electrical equipment for six new saloon cars and six "toast-rack" cars.—British Thomson-Houston Co., Ltd.

**Cardiff.**—According to the *South Wales Echo*, fourteen tenders were recently received by the Electricity Committee for a supply of low-pressure paper-insulated cables, and discussion arose as to whether the contract should be sent abroad, as the three lowest were from foreign firms—Belgian, Italian and German. After reviewing the whole of the circumstances the committee unanimously recommended the acceptance of the tender of the Belgian firm, the Ateliers de Constructions Electriques de Charleroi at £8,818, which was £2,188 below the lowest British tender.

**Chesterfield.**—Electricity Committee. Accepted:—
E.h.p. switch cubicle (£105).—British Thomson-Houston Co., Ltd.
2- and 3-core cable (£755).—Standard Telephones & Cables, Ltd.
4-core cable (£565).—Macintosh Cable Co., Ltd.

**Doncaster.**—Town Council. Accepted:—
L.p. cable (£1,427).—Enfield Cable Works, Ltd.

**Faversham.**—Town Council. Accepted:—
Cables (£1,100).—W. T. Henley's Telegraph Works Co., Ltd. The tenders received ranged from £1,308 to £814, the two lowest being for cables of foreign manufacture. W. T. Henley's Telegraph Works Co., Ltd., as the result of negotiations, reduced their original tender of £1,193 to £1,100 net.

**Forres.**—Managers of Leanchoil Hospital. Accepted:—
Installation of electric lighting in hospital (£732).—Claud Hamilton, Ltd.

**Glasgow.**—Statute Labour Committee. Accepted:—
Electrical installation at Stockwell Street buildings (£1,592).—James Laird & Co.

Tramways Committee. Accepted:—
Cable (v.i.r. and cab tire).—Standard Telephones & Cables, Ltd.
Copper trolley wire.—Thomas Bolton & Sons, Ltd.

**Halesowen.**—Accepted:—
Installing electric light at the new model factory at Hunnington, for Henry Vincent, Ltd.—Mr. B. French.

**Hull.**—Telephones Committee.
C.b. table instruments and dials:—

| | |
|---|---|
| International Electric Co., Ltd. ... ... ... ... ... | £749 |
| Sterling Telephone & Electric Co., Ltd. ... ... ... ... | 514 |
| Automatic Telephone Manufacturing Co., Ltd. ... ... ... | 514 |
| Standard Telephones & Cables, Ltd .... ... ... ... ... | 540 |
| Siemens Bros. & Co., Ltd. ... ... ... ... ... ... | 515 |
| **Peel-Conner Telephone Works.** (Accepted.) ... ... ... | 499 |

H.m. cords:—

| | |
|---|---|
| **British L. M. Ericsson Mfg. Co., Ltd.** (Accepted.) ... ... | 81 |

**Irish Free State.**—Dublin.—The following contracts were among those placed by the Controller of Stores, Department of Posts and Telegraphs, during the month January 23rd to February 22nd, inclusive:—
Cable suspenders.—Sparton Mfg. Co., Ltd.
Electrical protecting apparatus.—Phœnix Telephone & Electric Works, Ltd.; Siemens Bros. & Co., Ltd.
Indicators.—British L.M. Ericsson Mfg. Co., Ltd.; International Electric Works, Ltd.
Insulators.—W. J. Kellie; Harwell, Ltd.; and Litholite Insulators, Ltd.
Telephone keys.—Sterling Telephone & Electric Co., Ltd.
Relays.—Sterling Telephone & Electric Co., Ltd.
Stay rods.—T. W. Lench, Ltd.
Telephone cabinets and receivers.—Siemens Bros. & Co., Ltd.
Telephone mouthpieces.—North British Rubber Co., Ltd.; Siemens Bros. and Co., Ltd.
Zinc rod and strip.—London Zinc Mills, Ltd.
—*Irish Builder and Engineer.*

**London.**—Metropolitan Asylums Board.—Works Committee.
Installation of automatic telephones at the Downs Hospital for Children:—

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|---|---|
| **Buchanan & Curwen.** (Recommended.) ... ... ... ... | £934 |
| V. G. Middleton & Co., Ltd. ... ... ... ... ... ... | 1,020 |
| Riddle & Goddard, Ltd. ... ... ... ... ... ... ... | 1,033 |
| Toy & Winslow ... ... ... ... ... ... ... ... | 1,075 |
| **G. E. Taylor & Co.** ... ... ... ... ... ... ... | 1,105 |
| T. Clarke & Co., Ltd. ... ... ... ... ... ... ... | 1,200 |

Electric lighting installation at Southern (Upper) Hospital:

| | |
|---|---|
| Kershaws ... ... ... ... ... ... ... ... ... | £7,576 |
| **Read & Partners, Ltd.** (Recommended.) ... ... ... | 7,865 |
| T. Clarke & Co., Ltd. ... ... ... ... ... ... ... | 8,760 |
| Brightside Foundry & Engineering Co., Ltd. ... ... ... | 8,975 |
| Douglas Electric Light & Power Co. ... ... ... ... | 8,987 |
| Coley & Swinnerton, Ltd. ... ... ... ... ... ... | 9,450 |
| H. B. Giles ... ... ... ... ... ... ... ... ... | 10,221 |
| S. Dixon & Son, Ltd. ... ... ... ... ... ... ... | 10,722 |
| Taylor & Allen, Ltd. ... ... ... ... ... ... ... | 10,790 |

Electric lighting installation at Joyce Green Hospital:—

| | |
|---|---|
| **Douglas Electric Light & Power Co.** (Recommended.) ... | £9,997 |
| L. G. Slate & Co., Ltd. ... ... ... ... ... ... ... | 10,800 |
| T. Clarke & Co., Ltd. ... ... ... ... ... ... ... | 11,000 |
| Kershaws ... ... ... ... ... ... ... ... ... | 11,418 |
| Read & Partners, Ltd. ... ... ... ... ... ... ... | 11,703 |
| Brightside Foundry & Engineering Co., Ltd. ... ... ... | 11,985 |
| Coley & Swinnerton, Ltd. ... ... ... ... ... ... | 12,200 |
| Higginbotham & Sons ... ... ... ... ... ... ... | 12,200 |
| S. Dixon & Son, Ltd. ... ... ... ... ... ... ... | 12,408 |
| H. B. Giles ... ... ... ... ... ... ... ... ... | 12,704 |
| A. S. Goodwin & Co. ... ... ... ... ... ... ... | 13,700 |

Fire alarm system at Tooting Bec Hospital:—

| | |
|---|---|
| Riddle & Goddard, Ltd. (Withdrawn.) ... ... ... ... | £328 |
| **V. G. Middleton & Co., Ltd.** (Recommended.) ... ... | 397 |
| T. Clarke & Co., Ltd. ... ... ... ... ... ... ... | 395 |
| Toy & Winslow ... ... ... ... ... ... ... ... | 415 |
| W. H. Agar ... ... ... ... ... ... ... ... ... | 435 |
| G. E. Taylor & Co. ... ... ... ... ... ... ... ... | 440 |
| Buchanan & Curwen ... ... ... ... ... ... ... ... | 500 |

Hackney.—Electricity Committee. Recommended:—
Additional stand-by cooler unit and pump (£780).—C. A. Parsons & Co., Ltd.
E.h.p. switchgear for the works sub-station main power house switchboard (£1,037), works sub-station e.h.p. switchboard (£1,050), reactances (£1,162).—A. Reyrolle & Co., Ltd.

Hammersmith.—Electricity Committee. Recommended:—
150 yd. .2 sq. in. 3-core, 250 yd. .5 sq. in. concentric, and 2,000 yd. .25 sq. in. concentric cable (£1,816).—Macintosh Cable Co., Ltd.
Annual Contracts recommended:—
Insulating compound.—Dussek Bitumen Co., Ltd.
L.p. cables.—Macintosh Cable Co., Ltd.
Electrical goods.—Falk, Stadelmann & Co., Ltd.
Insulated wires.—W. Geipel & Co.
Joint boxes, &c.—Sykes & Dyson, Ltd.
Meters.—Chamberlain & Hookham, Ltd.

**Norwich.**—The Corporation has placed an order with Richard Garrett & Sons, Ltd., for a further eight 3½-ton electric refuse-collecting vehicles.

**Oldbury.**—Urban Council. Accepted:—
Stand-by motor for the vertical retort plant at the gas works (£71).—Electromotors, Ltd.

**Peterborough.**—The Town Council has placed with Messrs. Peter Brotherhood, Ltd., of Peterborough, a contract for the supply of electrical machinery for the power station extensions at £28,518. Two Continental tenders, which were about £6,000 less, were rejected.

**Ripon.**—Correction.—Messrs. Cox-Walkers were successful in securing the contract for the electrical installation for the Board of Guardians (see Elec. Rev., March 5th, p. 380), not Messrs. Cox-Walker & Partners. The two firms are separate concerns.

**Salford.**—With further reference to the note on page 380 (Elec. Rev., March 5th), the Town Council on Wednesday last week, after a long discussion, accepted the tender of the Nederlandsche Kabelfabriek, of Delft, Holland, for the supply of 4,500 yd. of l.p. cable of varying sizes to British standard specification, at £1,497. Alderman Billington, chairman of the Electricity Committee, in moving the adoption of the recommendation of the Electricity Committee, said the same firm had previously contracted to the satisfaction of the Corporation, and the price was £405 less than the lowest of a "non-ring" firm; on a previous contract a saving of £700 was effected. An amendment to refer the resolution back was supported only by 5 votes against 19, and the original motion was carried.

**Sunderland.**—Corporation. Accepted:—
Tower wagon and charging plant (£380).—Sunderland and District Transport Co., Ltd.

**Taf Fechan.**—Water Board. Accepted:—
Turbines and generators for high level supplies (£1,454).—James Gordon and Co., Ltd.

**Watford.**—Electricity Committee. Recommended:—
Two transformers (£708).—Metropolitan-Vickers Electrical Co., Ltd.
Air filter (£401).—Brush Electrical Engineering Co., Ltd.
Stokers, &c. (£3,910), air heaters (£2,500).—Underfeed Stoker Co., Ltd.
Switchgear (£250).—Plumtree & Co.
Two e.h.p. cubicles (£396).—Metropolitan-Vickers Electrical Co., Ltd.

# Forthcoming Events.

**National Association of Supervising Electricians (Manchester District Branch).**—Friday, March 12th. At the Y.M.C.A. Buildings, Peter Street, Manchester. At 7.30 p.m. Lecture on "Electric Driving of Textile Factories," by Mr. E. Preece.

**Birmingham Electric Club.**—Friday, March 12th. At the Grand Hotel, Birmingham. At 7 p.m. Annual dinner.

**Royal Institution.**—Friday, March 12th. At 21, Albemarle Street, W. At 9 p.m. Lecture on "Radiation from Electric Discharges," by Sir J. J. Thomson.
Saturday, March 13th. At 3 p.m. Lecture on "The Rare Gases of the Atmosphere," by Sir E. Rutherford.
Tuesday, March 16th. At 5.15 p.m. Lecture on "The Growth of Crystals," by Prof. C. H. Desch.

**Association of Mining Electrical Engineers (London Branch).**—Saturday, March 13th. Visit to Chislett Colliery, at the invitation of Mr. J. W. Robinson. Paper, "Some Notes on the Electrical Plant at Chislett Colliery," by Mr. C. Dawson.

**Royal Society of Arts.**—Monday, March 15th. At John Street, Adelphi, W.C. At 8 p.m. Cantor Lecture on "Thermometry," by Mr. W. F. Higgins.
Wednesday, March 17th. At 8 p.m. Lecture on "Co-partnership," by Lt.-Col. J. H. Boraston, C.B.

**Nottingham Society of Engineers.**—Monday, March 15th. At the Technical College, Derby. At 7.30 p.m. Joint meeting with the Derby Society. Paper on "Some Considerations Relating to Electricity Supply," by Mr. A. D. Phillips.

**Paisley Association of Electrical Engineers.**—Tuesday, March 16th. At 16, High Street, Paisley. At 7.30 p.m. Apprentice papers.

**Edinburgh Electrical Society.**—Wednesday, March 17th. At the Royal Society of Arts, 117, George Street. At 8 p.m. Paper on "Organisation," by Mr. P. J. Sims.

**Batti-Wallahs.**—Wednesday, March 17th. At the Hotel Victoria, W.C. At 7 for 7.30 p.m. Annual dinner.

**Institution of Electrical Engineers.**—Thursday, March 18th. At the Institution, Victoria Embankment, W.C. At 6 p.m. Paper on "Developments in High-power Fuses," by Mr. L. C. Grant.
**(South Midland Students' Section).**—Annual joint meeting with the Students' Sections of the Institution of Civil Engineers and the Institution of Mechanical Engineers. Friday, March 12th. At the Grand Hotel, Birmingham. Discussion on the "Design and Equipment of a Modern Factory," to be opened by Messrs. F. B. Warder, E. T. Hussell, and A. R. Cole.
**(Mersey and North Wales (Liverpool) Centre).**—Monday, March 15th. At the University, Liverpool. At 7 p.m. Informal discussion on "Electricity on Board Ship," to be opened by Mr. J. E. Allan and Mr. A. G. Barnard.
**(North-Eastern Centre).**—Monday, March 15th. At Messrs. Sopwith's Lounge, Northumberland Street, Newcastle-on-Tyne. At 7 p.m. Informal discussion on "Power Station Economics."
**(North-Western Centre).**—Tuesday, March 16th. At the Engineers' Club, Manchester. At 7 p.m. Paper on "Developments in High-power Fuses," by Mr. L. C. Grant. Annual general meeting.
**(Sheffield Sub-Centre).**—Wednesday, March 17th. At the Mappin Hall, St. George's Square, Sheffield. At 7.30 p.m. Paper on "Permanent Magnets in Theory and Practice," by Mr. S. Evershed.
**(Tees-side Sub-Centre).**—Monday, March 15th. At the Cleveland Technical Institute, Middlesbrough. At 7.15 p.m. Lecture on "Electro-farming; or the Application of Electricity to Agriculture," by Mr. R. B. Matthews.

**British Electrical and Allied Manufacturers' Association.**—Thursday, March 18th. At the Connaught Rooms, W. At 1 p.m. Annual luncheon.

**British Electrical Development Association.**—Friday, March 19th. At the Hotel Cecil, Strand, W.C. At 7 for 7.30 p.m. Annual dinner.

**Manchester Electro-Harmonic Society.**—Friday, March 19th. At the Albion Hotel, Piccadilly, Manchester. Monthly concert.

**Institution of Engineering Inspection.**—Friday, March 19th. At the Royal Society of Arts, John Street, Adelphi, W.C. At 7.30 p.m. Paper on "Lubricating and Allied Oils," by Mr. E. A. Evans.

**City & Guilds of London, Central & Finsbury Engineering Colleges Old Students' Associations (Northern Section).**—Friday, March 19th. At the Engineers' Club, Manchester. Annual dinner.

**Electrical Power Engineers' Association (London Western Section).**—Saturday, March 20th. At Stewart's Restaurant, Victoria Street, S.W. At 7 p.m. Annual dinner.
**(Kent Section).**—Saturday, March 20th. At Hollingworth Hall Church Institute, Maidstone. At 6 p.m. Lecture on the "Brush-Ljungström Steam Turbine," by Mr. J. R. Hutchings.

**Electrical Trades Commercial Travellers' Association.**—Saturday, March 20th. At the Manchester Hotel, Aldersgate Street, E.C. At 7.30 p.m. Grand carnival dance.

# Notes.

**The Batti-Wallahs' Society.**—At the annual general meeting, held on the 3rd inst., the following officers were elected for 1926:—President, Mr. A. W. Blake; vice-president, Mr. G. W. Partridge; hon. sec. and treasurer, Mr. M. Whitgift.

**Swiss Hydro-Electric Competition.**—The municipal authorities of Zurich are organising a premium competition, confined to Swiss engineers, for the best scheme for a dam and hydro-electric power plant in the Limmat.

**Registered Contractors.**—The following additional applications for registration were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its meeting held on March 5th :—

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| Haycraft, C. H., & Son, Ashton-on-Ribble | Knight, A. J., Newcastle-on-Tyne |
| Doyle, Charles, Gateshead-on-Tyne | McCullock & Newitt, Leeds |
| Girling, John, & Son, Ashington | White Bros., Leeds |
| Spink, T. H., Headingly, Leeds | Hapgood, R., & Co., Pontardawe, Glam |
| Weston Contracts Co., Euston, N.W.1 | Sproates, H. S., & Co., Middlesbrough |
| Dunkley, A. F., Margate | The Electric Service Co., Grimsby |
| Wilkinson, J. C., Leeds | Caffrey, T., Londonderry |
| Smith & Poyner, Leicester | Attree, L. G., Bishops Stortford |

**Fatality.**—According to the *Manchester Guardian*, John Morton, aged 10, of Longton, near Preston, received a fatal electric shock at Southport on March 4th. He was playing in a field near a school, of which he was a pupil, when he came into contact with a live wire, one of a number which supply the houses of the district with electricity.

At the inquest at Southport on March 6th it was stated that the cradle of the overhead wire had been dislodged by the gale and had come into contact with the wire, causing it to fall to the ground. Some schoolboys were playing, and Morton apparently gripped the wire. The borough electrical engineer said the wire was protected in accordance with the Board of Trade specifications. A verdict of "Death from misadventure" was returned.

**Electric Smelting.**—It is reported from Trondhjem that the A. S. Norsk Staal (Norwegian Steel Co.), which has been engaged on experiments with the method devised by Mr. Emil Edwin for the electrical production of steel, has proceeded so far that trial working on a larger scale is expected to be undertaken. The company has fixed on Glomfjord as a suitable site for the establishment of the proposed new plant, and an application has already been made to the State hydro-electric administration for the supply of 6,000 h.p.

**Local Societies.**—A party consisting of over 100 members of the Nottingham and Derby Societies of Engineers visited the Witton Engineering Works of the General Electric Co., on February 25th. The members were welcomed by Dr. A. H. Railing, the works director, and were entertained to luncheon at the G.E.C. Magnet Club.

**London Traffic Signals.**—According to *Modern Transport*, the Westinghouse Brake and Saxby Signal Co., Ltd., has been authorised by the Ministry of Transport to provide eight three-aspect coloured light traffic signals for the regulation of traffic along Piccadilly from east and west, and entering Piccadilly from the north by Berkeley Street, Dover Street, Albemarle Street, and Old Bond Street, and from the south by Arlington Street, and St. James's Street. A signal will be placed at the corner of each of the above-named streets to control the traffic entering Piccadilly, while the signals in Piccadilly for east and west traffic will be placed near the entrances from Old Bond Street and Berkeley Street respectively. The aspects displayed will be red for "halt," green for "proceed," and yellow, the latter bridging momentarily a period between "halt" and "proceed" to allow for slowing down or getting ready to move, as the case may be. These signals will be operated from a central control point situated in Piccadilly opposite the end of St. James's Street.

**Boiler Explosion Report.**—We have received a copy of the report of the preliminary inquiry held on the explosion from the water-screen of a boiler fired with pulverised fuel at the Prince's Generating Station, Birmingham. The boiler and screen are of the Vickers Boiler Company's make. The second tube from the left-hand side in the water screen inside the rear wall of the combustion chamber was ruptured for a length of about 12 in. and the explosion was due to the overheating of the tube, caused, it is thought, by shortness of water. All the other tubes in the screen showed signs of having been overheated. No material damage was caused by the explosion, showing that there was very little potential energy in the boiler at the time. There were five boilers on range at the time of the explosion; four of these are situated in close proximity to the feed pumps and the fifth, the one in which the explosion occurred, is about 200 ft. away. The boiler has an economiser superimposed above it, and, owing to the height of the boiler, the feed inlet is about 20 ft. higher than the inlet to the other boilers. The low-water alarm, which was blowing at the time, did not attract the attention of the engineer-in-charge. In order to sustain the pressure in the feed main, orders have now been given that when any of the boilers of this type are steaming an additional feed pump, which is situated at the same end of the boiler house, is to be used.

**A Tibetan Tragedy?**—Some months ago we reported that Messrs. Crompton & Co., Ltd., were supplying electrical machinery to Lhasa, the capital of Thibet. The *Daily Mail* states that the party, in charge of a young Tibetan engineer who had received an English education, which was transporting the equipment to the "Forbidden City" was massacred *en route* and the machinery was thrown over a precipice. According to a *Reuter* message from Delhi, however, this report has been authoritatively denied.

**Large Diesel Engines at Hamburg.**—In the course of the discussion on Mr. Geoffrey Porter's paper on "Heavy-Oil Engine Installations; Choice of Site and Lay-out of Plant," at the recent meeting of the Diesel Engine Users' Association, Mr. W. Roylands Cooper gave some interesting information concerning Diesel engines of large powers. He referred to an engine developing about 4,000 b.h.p. in four cylinders which he had recently inspected at the works of the M.A.N. Company, at Augsburg, and also to the 15,000-brake-horsepower Diesel engine built for the Hamburg electricity supply undertaking by Messrs. Blohm & Voss. It was evident, he said, that Continental engineers were of the opinion that large-sized Diesel units would find a very important use in interlinking schemes, both in connection with large water-power plant and large steam turbine installations. The 10,000-kW set at Hamburg was comparable with the large turbo-generators now in use. It was of great interest, particularly the generator, which was water-cooled and of a special low-speed design. The engine was of the M.A.N., double-acting, two-cycle type, such as had been installed in, and ordered for, several German ships. It was a nine-cylinder set; the overall length of the engine was about 73 ft., and its breadth about 14 ft.; the height from the floor to the top of the valves was about 33 ft. Mr. Roylands Cooper suggested that it would be a matter of importance for the Association to watch very closely the use of this size of set on the Continent and to see if it was not advisable to adopt larger Diesel engines in our schemes of interlinking in this country. British-built engines were now available for large powers.

**A Large Electric Cooking Installation.**—An interesting installation of electric-cooking equipment, designed for dealing with 150 luncheons daily, has recently been provided at Unity

**Electric Cooking Equipment at Unity House.**

House, the headquarters of the National Union of Railwaymen. The apparatus includes a double roasting oven, boiling table, and a combined hot-closet and serving table. The internal dimensions of the ovens are 24 in. high, 24 in. deep, and 22½ in. wide; the total loading of each oven is 5 kW, and they are controlled by rotary multiple switches.

The boiling unit dimensions are 5 ft. 6 in. x 2 ft. 6 in. x 2 ft. 9 in. high. This is equipped with six separate 1,600-W elements. The hot closet and serving table is 5ft. long, 2 ft. 6 in. wide and 2 ft. 6 in. high. Two sets of elements, one beneath the lower shelf, and one beneath the hob of the serving table, are separately controlled.

The equipment, supplied by the General Electric Co., Ltd., was installed by Messrs. Burdette & Co., Ltd.

**Accident.**—An explosion which occurred in the boiler house of the Keswick (Cumberland) electricity-works on March 1st caused serious injuries to Thomas White and George Whittle. It is believed that one of the men threw some oil on the furnace and thus caused the explosion. It was customary to dispose of the waste oil from the Diesel plant in this manner, instead of throwing it into the beck, but on this occasion the dampers were closed, and the oil blew out one of the doors of the boiler.

**Appointments Vacant.**—Deputy transportation superintendent, electric traction section (Rs.1,750 per calendar month) for the Indian State Railways. Power station fitter for the Worcester Corporation Electricity Department. Switchboard attendant (65s.) for Newton Abbot Power Station. (See our advertisement pages to-day.)

**Multiple Tariff Electricity Meters.**—In a paper read before the Union des Centrales Suisses d'Electricité, M. L. Martinet, electrical engineer, Neuchatel, described the methods adopted by the municipality to increase the energy consumption, by the introduction of tariffs varying in amount according to the period of the day and year, to encourage consumption during the ordinary low-peak hours by lower charges. After considerable research, means were devised for converting the existing meters into multiple-tariff meters by interrupting the shunt circuits by means of suitable central clocks. A 50 per cent. tariff reduction is effected by breaking the shunt circuit for one minute out of every two, proportional time breaks being adopted for other tariff reductions. Several meters in any particular building, street, or section, are dealt with by means of a pilot wire to which the shunts are connected. This system facilitates the rendering of accounts, but it does not give a record of the energy consumed. Although this is considered unimportant, in that it has only a statistical value, a somewhat different form of meter has been introduced, which, while requiring only a single pilot wire, actuates not only the amount-recording dial, but also a relay and mechanism showing the kWh consumed. The two forms of multiple-tariff meter have both been approved by the Swiss Federal Weights and Measures Department. Five different tariffs are in operation on the Neuchatel system. Out of the 10,102 meters installed, over 5,000 are of the multiple-tariff type, and the number is steadily increasing. These are controlled by 1,561 clocks, or an average of about 3 meters per clock.

**International Electrotechnical Commission.**—NEW YORK MEETING.—The list of delegates to the meeting of the International Electrotechnical Commission and the International Conference on Standardisation, to be held next month, is headed by the names of Signor Guido Semenza, President, I.E.C.; Dr. C. O. Mailloux, E.E., Honorary President, I.E.C.; Col. R. E. Crompton, C.B., R.E., Honorary Secretary, I.E.C.; and Mr. C. le Maistre, C.B.E., General Secretary, I.E.C. Seventeen countries will be represented; omitting Canada and the United States, whose representatives' names will be included later, there are 94 names in the list. The following are the British delegates:—President, Sir Richard Glazebrook, K.C.B. (Chairman, British National Committee). Vice-Presidents: Sir Archibald Denny, Bart. (Chairman, British Engineering Standards Association); Mr. L. B. Atkinson (Director, Cable Makers' Association); Mr. C. P. Sparks (Vice-Chairman, British National Committee); Mr. S. T. Allen (Municipal Electrical Engineer, Wolverhampton); Mr. E. G. Batt (General Electric Co.); Mr. W. S. Burge (English Electric Co.); Mr. S. B. Donkin (Association of Consulting Engineers); Capt. P. Dunsheath (W. T. Henley's Telegraph Works); Mr. A. R. Everest (British Thomson-Houston Co.); Mr. J. P. Gregory (British Thomson-Houston Co.); Mr. W. Lee (Silvertown Lubricants, Ltd.); Mr. S. W. Melsom (Callender's Cable and Construction Co.); Dr. A. C. Michie (Electrical Research Association); Mr. R. B. Mitchell (President, Incorporated Municipal Electrical Association); Mr. A. P. Mossay (Electric Vehicle Committee of the U.K.); Mr. J. S. Peck (Metropolitan-Vickers Electrical Co.); Mr. C. Rodgers (Secretary, British Electrical and Allied Manufacturers' Association); Mr. T. Roles (Municipal Electrical Engineer, Bradford); Mr. P. F. Rowell (Secretary, Institution of Electrical Engineers); Mr. F. Wallis (English Electric Co.); Lt.-Col. K. Edgcumbe (Everett, Edgcumbe & Co.); Representative of the Railway Companies; Mr. P. Good (Secretary of the British Delegation). The four gentlemen first named will represent the B.E.S.A. at the International Conference on Standardisation to be held in New York on April 17th and 18th.

**Large Concrete Pipe.**—One of the largest concrete pipes in the world is being laid in the French Alps, and will help to provide power for industrial works at Grenoble. It has an internal diameter of 19 ft. 6 in., and when completed will be nearly a mile in length.—*Financial Times.*

**Thermal Expansion of Tungsten.**—Scientific paper of the Bureau of Standards, No. 515 (Dept. of Commerce, Washington, U.S.A.), by Messrs. Peter Hidnert and W. T. Sweeney, gives the results of an investigation on the thermal expansion of tungsten (99.98 per cent.). The expansion of tungsten is given by the following empirical equation:

$$L_t = L_0 [1 + (4.28\, t + 0.00058\, t^2)\, 10^{-6}]$$

applicable between − 105 and + 502 deg. C.

The coefficients of expansion increase regularly with temperature. From 0 to 500 deg. C. the average coefficient of expansion is $4.6 \times 10^{-6}$ per degree.

**Telephotography.**—The German Wireless Co. (Telefunkengesellschaft) claims to have beaten all speed records in the transmission of wireless photography between American stations and the German station at Nauen. According to the *Manchester Guardian*, it has succeeded in transmitting 15,000 apertures per second, a speed equivalent to the transmission of 25 words per second. This achievement shows progress, as text and diagrams can be transmitted simultaneously with pictures. At the annual dinner of the Institution of Electrical Engineers in London, the president, Mr. R. A. Chattock, remarked that the Marconi Co. had recently transmitted his photograph and signature across the Atlantic Ocean by means of "wireless." Photographs of the Lenglen-Wills lawn tennis match at Cannes were transmitted over the telephone wires from Nice to Paris by means of the Belinograph process.

**The Jean Bares Prize.**—Among the annual premiums awarded by the French Office National des Recherches Scientifiques et Industrielles is that known as the Jean Eares, which is offered to the inventor "who is the father of at least three children," and who is regarded as having rendered the greatest service to French industry. For 1925, the premium, which amounts to 10,000 fr., has been awarded to M. Vedovelli, who has been responsible for over 100 patents, and has a wide reputation in connection with high-pressure electrical apparatus and control gear. M. Vedovelli was responsible for the electric luminous fountains at the Paris Exhibition of 1900, and for the electric waterfall and other electrical illuminations at the Paris Decorative Arts Exhibition of 1925.

**Impact Stress in Granular Materials.**—At a recent meeting of the Physical Society of London, the application of the piezo-electric properties of a Rochelle salt crystal and the tri-electrode valve to the determination of impact stresses in granular materials was demonstrated by Messrs. J. J. Hartley, M.Eng., M.Sc., A.M.Inst.C.E., and R. H. Rinaldi. The apparatus employed was designed to utilise the charge of a strained crystal for the measurement of impact stresses in sands. A crystal was shown mounted between two brass plates and initially strained to 15 kilogrammes by means of three springs; this had an impact load of 400 gm. steadily applied to a lever arm which gave the strained crystal a further torsional strain. A negative charge was collected from the tinfoil girdle, about the major axis of the crystal, and was applied to a valve grid, causing a fall in the small steady plate current on a microammeter.

## Institution Notes.

**Institution of Electrical Engineers.**—SHEFFIELD SUB-CENTRE.—In an address to the Sub-Centre, Mr. R. A. Chattock, the president of the Institution, said that railway electrification still seemed to be hanging fire in this country, apparently due to the apathy, or conservatism, of the railway magnates. The way was already being shown on the Continent; the electrification scheme for the Paris-Orleans Railway, it was specially illuminating to realise, was designed to utilise several sources of power, hydro-electric stations were to work in company with the large steam-driven stations in Paris and elsewhere. This was a proposal that would appear to be very highly desirable from the point of view of the new Government scheme, as it would undoubtedly have the effect of considerably increasing the load factor and consequently of cheapening the cost of producing electrical energy throughout the country. It was thought, he hoped very wrongly, that railway engineers in this country would not agree to purchase their energy from public supply undertakings, chiefly on the score of reliability and not themselves having control of the stations. Also, so far, no mention had been made of including the supplies to railways in the Government scheme. He hoped that this proposal would not be overlooked when the scheme developed. Referring to the developments taking place in the electricity supply industry, Mr. Chattock said that low-temperature carbonisation of coal was likely to revolutionise boiler-house practice. The Milwaukee Electric Railway and Electric Light Co., in the United States, would soon have a plant at work for skimming the volatiles from pulverised fuel and passing the residue on to the boiler house still in its pulverised form. The results would be watched with the greatest interest, and if such a process could be commercially possible it should be of the greatest value.

**Junior Institution of Engineers.**—At a special meeting of the above Institution held at the Engineers' Club, Birmingham, on March 5th, a paper on "Lifting and Shifting Machinery," was read by Mr. C. H. Woodfield, M.I.Mech.E. The author described a great many types of electric cranes and showed the advantage of compensated luffing gear. Steel wireless masts 820 feet in height, recently erected by the lecturer in South Africa, were described; the chief difficulty encountered during erection was caused by high winds. A three-storied cage passed up the interior of the triangular mast, being hoisted by a wire rope attached to the engine of a "Ford" car.

In a paper on "Tendencies in Modern Electric Practice," presented by Mr. J. M. Seddon, A.M.I.E.E., several of the latest hydro-electric stations in Sweden were described. It was emphasised that the civil engineering work in connection with these power stations were very costly, and the energy supplied by them to consumers was on the average more expensive than that supplied by the cheaper English companies. Their existence was principally justified by the fact that coal was dear. Steam stations were next discussed with special reference to powdered fuel. The dust and grit which was ejected from the chimneys of powdered-fuel plants presented a difficulty, but special fan arrangements had been devised to overcome this.

In the discussion which followed, the majority of speakers expressed the opinion that there was not much prospect of reducing the cost of electricity by linking up on a large scale, or by any advance in the method of generating which was likely to occur in the near future. The main hope was in improving the load factor by attracting off-peak loads at very low rates, such as water heating through the night. Several Borough Councils now supplied electricity for this purpose at ½d. per kWh.

**Institution of Heating and Ventilating Engineers.**—In a paper read before the above Institution on the design and application of electric motors relative to heating and ventilating, Mr. Joseph Meech, A.M.I.E.E., dealt very fully with the design of various types of motors used for fan and pump work, and the methods of driving, speed control, and attaining silence. He explained how a contractor who had a motor in stock could utilise it on a pressure for which it was not primarily designed. The causes of hunting and surging were considered. Mr. Meech concluded with some notes on power factor and starting and controlling devices, and urged the consideration of the advantages of remote control for motors scattered over a building.

**Society of Engineers (Inc.).**—On Monday last, Mr. W. M. Beckett, M.B.E., read a paper on "Tidal Power on the River Severn," giving details of his survey of the site which he considered best suited for the construction of a dam across the estuary, and discussing the various methods of utilising tidal power. His proposals included the installation of 100 turbines, yielding an average output of 150,000 b.h.p. over 12 hours' day load, and 50,000 b.h.p. over 12 hours' night-load, with a maximum demand of 250,000 b.h.p. The scheme contemplated the construction of a large storage reservoir on the River Augidy, a power house on the River Wye, and a tunnel 35 ft. in diameter. Surplus power would be used to pump water through the tunnel into the reservoir, which would drive turbines when those on the Severn were not able to cope with the load. The total cost of the scheme was estimated at 12 million pounds, including about one million for transmission lines and transformer stations. The net income was estimated at one million pounds per annum.

**Institute of Metals.**—The Institute has just issued to its members a ballot paper containing the names of 77 candidates for membership—a record list. This is the last occasion upon which a postal ballot for the election of members will be taken. In future election to membership will be by the Council, the first election under the new arrangement being held on April 21st.

**Electrical Association for Women.**—On Tuesday last, a party of members of the Association paid a visit to the Ideal Home Exhibition, where they gave particular attention to the E.D.A.'s "Electric House" and the stands of Messrs. L. G. Hawkins & Co., Ltd., Freezone, Ltd., Electrolux, Ltd., and other electrical exhibits.

## Our Personal Column.

**(Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements).**

Mr. LESLIE GORDON, town clerk of St. Marylebone, having accepted the unanimous invitation of the Joint Electricity Authority for the London and Home Counties Electricity District, established by Parliament last year, to act as clerk, solicitor and Parliamentary agent to the Authority, has resigned his present office, to which he was appointed in 1924. His knowledge of London's electricity problems, the solution of which has been entrusted to the Joint Authority, is stated to be unique. For many years he acted honorarily as clerk to the Conference of Local Authorities Owning Electricity Undertakings in London and the Home Counties, which was formulated to safeguard and co-ordinate the interests of the authorities in question.

Mr. J. S. TRELEASE, assistant technical engineer in the Salford Corporation electricity department, has been appointed electrical clerk of works to the County of London Electric Supply Co. On the occasion of his leaving Salford, he was presented with a mahogany clock by Mr. S. J. Watson, borough electrical engineer, on behalf of the whole of the staff of the department.

The Bradford City Council has approved the following salary increases:—Mr. THOS. ROLES, city electrical engineer, from £1,500 to £1,600 per annum; Mr. J. FAIRBURN, works superintendent, from £618 to £695; Mr. C. E. ALLSOPP, commercial assistant, from £618 to £695; Mr. C. A. GILLIN, mains engineer, from £516 to £561; Mr. G. W. HODSMAN, chief draughtsman, from £469 to £516; Mr. H. E. BOTTOM, assistant sales engineer, from £3'6 to £365; Mr. H. NEWSHAM, chemist, from £278 to £312; and Mr. R. H. WILKINSON, tramway manager, from £1,000 to £1,100.

Mr THOS ROLES has been authorised by his Committee to accept an invitation to be one of the delegates to attend, on behalf of the British Engineering Standards Association, the forthcoming conference in New York with reference to the formulation of international standards for electrical and other machinery

On March 1st, Mr. ROBERT BIRKETT was entertained to dinner by his staff to celebrate his completion of 21 years' service as borough electrical engineer of Southend. Mr. A. C. Johnson, assistant electrical engineer, who presided, presented Mr. Birkett with an inscribed gold watch on behalf of the staff.

According to the *Electrical Engineer of Australia*, Mr. M. C. TIMMS, of Messrs. Siemens Bros. & Co., Ltd., Melbourne, was to leave for England at the end of January to take up an important technical appointment in the cable works of his company at Woolwich, dealing largely with research work and new developments in electric cables.

Mr. WILLIAM HAINSWORTH, who has been commercial assistant to Mr. C. H. Yeaman, city electrical engineer, for the past six years, is leaving the service of the Stoke-on-Trent Corporation to take up a similar position in the Croydon Electricity Department. He was recently presented with a silver cigarette case by Mr. Yeaman, on behalf of the members of the staff and the department.

The Stoke Corporation Electricity Committee has appointed Mr. T. LOCKETT as commercial assistant at a salary of £250 per annum, plus bonus, in place of Mr. W. Hainsworth.

The Newcastle-on-Tyne Corporation Transport and Electricity Committee has recommended to the City Council that Mr. THOMAS P. EASTON be appointed general manager, and Mr. W. T. DALTON, engineer, of the tramways, in place of Mr. E. Hatton, who has just resigned. Mr. Hatton's duties will thus be split, at, it is understood, an increased cost of about £150 a year. Mr. Hatton's salary was £1,650, and under the new scheme the general manager will receive £1,000 and the engineer £800 per annum. Mr. Easton has been with the Corporation for 25 years.

On the unanimous recommendation of its Electricity Committee, the Exeter City Council has resolved that the remuneration of Mr. H. D. MUNRO, the chief electrical engineer, shall be in accordance with the minimum salary scale of the Associated Municipal Electrical Engineers (Great Britain and Ireland).

The Wimbledon Council has resolved by 20 votes to 4, to increase the salary of Mr. A. E. MCKENZIE, the borough electrical engineer, from £1,500 to £2,000 per annum, as from April 1st. If the net profits for 1926-27 or any of the following three financial years, exceed £30,000, he is to be paid a bonus of 2½ per cent. on the profits in excess of this figure. We understand that Mr. McKenzie is still free to practise as a consulting engineer.

Ald Sir G. H. HUME, M.P., M.I.E.E., has been elected chairman of the London County Council for the ensuing year.

Mr. T. A. EDISON celebrated his 79th birthday on February 11th, at his winter home in Florida.

Mr. MAXWELL WEEBER has been appointed electrical engineer to the Haworth Urban District Council.

**Obituary.**—MR. H. HATFIELD.—We regret to record the death of Mr. Henry Hatfield, I.S.O., Chief Examiner at the Patent Office for 31 years, from which post he retired six years ago.

MR. G. STEVENSON.—We regret to learn that Mr. George Stevenson, A.M.Inst.C.E., M.I.E.E., assistant sales manager of the Chloride Electrical Storage Co., Ltd., passed away on Sunday last. He became ill while travelling to Bordighera from Paris and died at Mentone station.

## New Companies Registered.

**Birkbys, Ltd.** (212,173).—Private company. Registered March 5th. Capital, £40,000 in £1 shares. Objects: To acquire the business of specialists in synthetic resin insulation carried on at Liversedge, Yorks., and elsewhere, to adopt an agreement with A. T. Birkby and F. E. Birkby, and to carry on the business of electricians, electrical, wireless and mechanical engineers, manufacturers of and dealers in mouldings, moulding powder, resin, varnish, and other articles used in synthetic resin insulation, &c. The first directors are:—A. T. Birkby, The Nook, Liversedge, electrical engineer; F. E. Birkby, Round Oak, Mirfield, electrical engineer (both permanent, subject to holding 5,000 ordinary shares each). Qualification of other directors, 500 shares. Remuneration as fixed by the company. Solicitors: Mumfords & Gordons, 14, Piccadilly, Bradford. Registered office: Woodfield Mills, Liversedge.

**Hopkinsons, Ltd.** (212,201).—Registered as a public company on March 5th, with a nominal capital of £700,000 in £1 shares (350,000 preference and 350,000 ordinary). The objects are:—To acquire the goodwill of the businesses of manufacturers of and dealers in boilers, boiler flues, mountings and fittings and valves of every description belonging to J. Hopkinson & Co., Ltd., and carried on at Huddersfield and elsewhere; to take over and undertake all or part of the assets and liabilities of those businesses; for that purpose to enter into an agreement with the British Shareholders Trust, Ltd., to carry on in Great Britain or elsewhere, both directly and by means of subsidiary companies all or any of the trades or businesses of mechanical and electrical engineers, machine and engineering tool makers, makers of boilers, mountings and fittings, &c. Minimum cash subscription, 7 shares. The directors are:—R. A. Hopkinson, 36, York Place, Harrogate, manufacturer; E. W. Crammond, 3, Lombard Street, E.C. (director of Platt Bros. and Co., Ltd., and managing director of British Shareholders Trust, Ltd.); N. H. Docker, Wootton Courtinay, Taunton, Somerset, and 4, Central Buildings, Westminster (director of John Wilkes, Sons & Mapplebeck, Ltd., and International Combustion, Ltd.); C. J. Hofton, Holme Villas, 10, Holme Road, West Bridgeford, Notts., salesman; P. G. Hopkinson, 12, Cambridge Road, Huddersfield, engineer; Sir William Ramsden, Kt., J.P., Marshfield, Huddersfield, solicitor; R. S. Turnbull, 1, Alwinton Terrace, Gosforth, Newcastle-on-Tyne, salesman. Qualification, £500. Remuneration, £2,400 per annum divided between them. Solicitors: Pinsent & Co., 6, Bennetts Hill, Birmingham.

**J. H. Runbaken, Ltd.** (212,068).—Private company. Registered March 1st. Capital, £7,500 in 3,800 "A" ordinary shares of £1 each and 74,000 "B" ordinary shares of 1s. each. Objects:—To acquire the business of an electrical engineer carried on by J. H. Runbaken at 30, Tipping Street, Manchester. The permanent directors are:—J. H. Runbaken (managing director), "Maryvale," Hilltop, Wilmslow; C. Lewis, "Roselawn," 68, Chartfield Avenue, Putney; J. C. Maurice, 33, Muswell Hill Road, N. (all permanent, subject to each holding 100 shares). Qualification of directors, 500 shares. Remuneration, £25 each per annum. Solicitors: Woolfe and Woolfe, 13a, Old Burlington Street, W. Registered office: 30, Tipping Street, London Road, Manchester.

**Wagner Electric Supplies, Ltd.** (212,107).—Private company. Registered March 2nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical apparatus, including engines, turbines, generators, motors, transformers, switchboards, cables, meters, fans, lamps, and all devices suitable for electric generating stations, &c. The directors are:—H. C. Walsh, 28, Swinderby Road, Wembley, C.A.; A. Woolley, "St. Andrews," Burford Road, Bickley, accountant. Secretary: D. A. Turner. Solicitor: H. F. Strouts, Monument Station Buildings, E.C.4. Registered office: 49, Eastcheap, E.C.4.

**Fordham Electrical Engineering Co., Ltd.** (212,016).—Private company. Registered February 26th. Capital, £2,000 in £1 shares. Objects:—To carry on the business of electricians, electrical and mechanical engineers, wireless engineers, &c. The subscribers (each with one share) are:—C. Ashton, 253, Clapham Road, S.W.8, funeral furnisher; Mrs. K. Ashton, 333, Clapham Road, S.W.9. The permanent directors are:—W. Ashton and C. Ashton.

**Midland Electric Lamp Co., Ltd.** (212,135).—Private company. Registered March 3rd. Capital, £100 in £1 shares. Objects: To carry on the business of electrical engineers, factors and dealers, manufacturers of electrical goods, &c. The first directors are:—S. Swerling, 140, Leicester Road, Higher Broughton, Manchester, cotton goods merchant; M. End, 40, Cramp Street, Higher Broughton, Manchester, lamp factor. Qualification, £1. Secretary: S. Swerling. Solicitor: S. Linder, 7, Brazennose Street, Manchester. Registered office: 5a, St. Peter's Square, Manchester.

# Official Returns of Electrical Companies.

**Callender's Cable & Construction Co., Ltd.** (48,915).—Reverting to the notice published here on February 26th, we should state that since the date of the last annual return (June 11th, 1925), the capital has been increased from £1,300,000 to £1,500,000 in £1 shares. On July 25th, 1925, 100,000 of the new shares (ordinary) were allotted, making the nominal amount of the issued capital £1,400,000 (£600,000 ordinary and £400,000 preference, and £400,000 "B" preference). To June 11th, 1925, £1,025,000 had been paid up in cash, and £275,000 was considered as paid. At July 2nd, 1925, 15s. per share was paid or due and payable on the 100,000 new ordinary shares. We understand that the remaining 5s. per share has been paid up since the date named, making the paid-up capital £1,125,000. Mortgages and charges at June 11th, 1925, £300,000.

**Telephone Manufacturing Co., Ltd.**—Particulars filed of debentures for a principal sum not in any event exceeding a third of the total secured rentals as defined in the trust deed, together with a premium of 2 per cent., authorised by resolutions of November 29th, 1921, December 16th, 1925, and February 11th, 1926, and having the benefit of a trust deed dated February 17th, 1922, charged on the premises comprised in the said trust deed, the amount of the present issue being £20,000, ranking *pari passu* with £310,000 already registered in accordance with the provisions of the trust deed. Trustees: London City and Midland Executor and Trustee Co., Ltd., 5, Princes Street, E.C.2.

**India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.** (1,122C).—Capital, £1,250,000 in 750,000 ordinary, 250,000 preference, and 250,000 unissued shares of £1 each. Return dated December 10th, 1925. 750,000 ordinary and 250,000 preference shares taken up. £1,000,000 paid. Mortgages and charges, £400,000.

**Electron Co., Ltd.**—Particulars filed of £1,500 debentures authorised by resolutions of September 22nd, 1925, and February 2nd, 1926, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

**Simmonds & Stokes, Ltd.**—Issue on February 23rd, 1926, of £1,000 debentures, part of a series already registered.

**Cleveland and Durham Electric Power, Ltd.**—Satisfaction to the extent of £12,100 on various dates between March 19th, 1925, and February 9th, 1926, of debentures secured by trust deed dated October 6th, 1913, and supplemental trust deed dated December 31st, 1918, securing £250,000.

**Technical Instrument Case Manufacturing Co., Ltd.**—W. B. Pearson, of 5, John Street, Bedford Row, W.C.1, ceased to act as receiver or manager on February 17th, 1926.

**Robins Wholesale Electrical and Wireless Co., Ltd.**—J. W. Williams, of 5, St. Andrew's Crescent, Cardiff, ceased to act as receiver or manager on February 23rd, 1926.

**British Ebonite Co., Ltd.**—Particulars filed on February 20th, 1926, of £10,000 debentures authorised April 27th, 1925, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

**Attaix, Ltd.**—Mortgage on the company's property, present and future, including uncalled capital, dated February 10th, 1926, to secure all moneys which the mortgagee (H. Benger, South-Western Hotel, Southampton) may be called upon to pay under a guarantee to bankers to secure an overdraft up to £500.

**Davis Electrical Co., Ltd.** (177,301).—Capital, £1,000 in £1 shares. Return dated December 31st, 1925. 677 shares taken up. £377 paid. £300 considered as paid. Mortgages and charges, nil.

**Elba, Ltd.**—J. Chapman, of 46, King's Road, Sloane Square, S.W.3, ceased to act as receiver and manager on June 16th, 1925. (Notice filed February 24th, 1926.)

**Red Seal Products, Ltd.**—E. A. Mallett, of 32-34, Theobald's Road, W.C.1, was appointed receiver on February 23rd, 1926, under powers contained in debenture dated February 3rd, 1926.

**Llangollen and District Electric Light and Power Co., Ltd.**—Satisfaction in full on February 5th, 1926, of debenture and mortgage dated December 14th, 1907, securing £400.

# City Notes.

## Reports and Meetings of Electrical Companies, Dividend Results, &c.

**Charing Cross Electricity Supply Co., Ltd.**

The accounts for the past year show that the gross earnings of the West End Undertakings were £325,985 (as compared with £304,013), and that the net earnings were £144,690, as against £113,621. A balance of £19,444 brought forward, and £55,667, interest, &c., are added, making £219,800. After providing for depreciation (£22,000), debenture interest, preference dividend and interim ordinary dividend (1s. 6d. per share) there remains £118,771. It was proposed to pay a final dividend at the same rate on the ordinary shares, to transfer £55,000 to general reserve (income) account, and to carry forward £20,571. The connections are stated to total 29,896 kW.

The gross earnings of the City Undertaking were £417,862 (against £423,811), and the net earnings £211,004 (£217,222). A balance of £20,300 brought forward is added, making £231,305, and after deducting debenture interest, &c., preference dividend, and an interim dividend at the rate of 2s. per share on the ordinary shares, there remains £105,217. From this, £85,000 is to be transferred to the general reserve (income) account, and the balance (£20,217) is carried forward. The connections now amount to 35,142 kW. The report refers to the reorganisation of London electricity supply, and states that the directors are engaged in taking the necessary steps to carry out the arrangements embodied in the Act. Referring to the capitalisation of the company's free reserves for distribution as bonus shares, the report says that the amount for the City is settled by the Act as £200,000, but the figure for the West End has not yet been ascertained as certain adjustments have to be made and approved by the authorities concerned. It is not proposed to make any distribution of bonus shares to the ordinary shareholders of the West End Undertakings until the whole amount available is known, when a further general meeting of the shareholders will be called. In the meantime the directors propose to bring the £200,000 through the Suppliers Construction Co. into the accounts of the West End Undertakings.

The annual meeting was held on March 4th. Mr. W. F. Fladgate (chairman), who presided, said that the directors had considered the amalgamation of the accounts of the City and West End Undertakings, but did not think that that was expedient. The progress of the undertaking as a whole had been extremely satisfactory. The energy sold had increased by over four million kWh, although 1¼ million kWh of this was a temporary supply to the Metropolitan Electric Supply Co., Ltd. The gross revenue had increased by £12,000 while the expenses had been reduced by some £10,000, making a net increase of about £22,000. That was mainly due to the efficiency of their Bow station, aided to a small extent by cheaper coal. The accounts of the City Undertaking showed decreased receipts due to the reduction of charges to consumers. The expenses were, however, about the same in spite of the increased output. After dealing at some length with the changes in organisation, the chairman said that owing to the special terms of the City Provisional Order they had succeeded in getting a specific sum of £200,000 allowed to them without waiting for the result of the valuation. They had also succeeded in obtaining a provision that the rate of dividend, which in the case of all the other companies was to be reduced from 10 to 7 per cent. in 1931, was in respect of the City Undertaking to continue without reduction until 1936. Mr. Fladgate said that a gratifying response had been made to the recent issue of capital by the London Power Co., which showed that the investing public considered the scheme a sound one. He deprecated the attitude of hostility which had been adopted by the directors of some of the gas companies. He thought that there was ample room for both industries, and that their interests would be better served by friendly relationship.

The report and accounts were adopted, and subsequently a resolution was passed authorising the directors to create a further 150,000 City Undertaking ordinary shares of £1 each, ranking *pari passu* with the existing shares; and to capitalise a sum of £200,000 of the undivided profits of the company for distribution as ordinary shares to the present ordinary shareholders in the proportion of four new shares to each seven now held.

At the conclusion of the proceedings Mr. J. M. Gatti expressed appreciation of the chairman's services, and asked him to sit for a portrait to be hung in the board room. The chairman expressed his thanks and the meeting terminated.

**Telegraph Construction and Maintenance Co., Ltd.**

The annual meeting was held on March 4th, the Earl of Selborne, K.G., in the chair. In proposing the adoption of the report, the chairman, dealing first with the accounts, said there was an increase of £382,482 under the head "Debts owing by the Company," which was due to the receipt of instalments for cable not actually laid before the close of the year. That figure was reflected on the credit side by the greatly increased value of property, &c., which stood at £1,369,570, an increase of £960,794 over the figure for the previous year, which was due to the very large stocks of manufactured cable and of material purchased for cable to be made during the current year. The net profit amounted last year to £110,630, and adding £114,861 brought forward from the previous year they had a total of £225,492. Out of that amount the interim dividend, amounting to £22,410, had been deducted, leaving £203,082 for disposal. The directors proposed to distribute the same dividend as in the previous year (10 per cent.) and again add £30,000 to the reserve fund, which would leave £105,852 to be carried forward. On the occasion of the last general meeting, Mr. Colin Campbell, who presided in his absence, had referred to the fact that rather less profit than usual was shown, which, he had said, was due to an additional expenditure on buildings and machinery erected for carrying out a most important and interesting experiment for the Western Union Telegraph Company in connection with a submarine cable, having some special features, which they had manufactured and laid between New York and the Azores. The chief feature consisted in covering the copper conductor with a thin metal wrapping of special high permeability alloy before being insulated with the usual gutta-percha, and cables

of this kind were now commonly known as "loaded." In the particular cable to which he had referred, the alloy used was known as "permalloy," and was supplied for the purpose by the Western Electric Company of New York. The results obtained in the working speed of this experimental cable had been such that the Western Union Telegraph Company determined to take full advantage of its superiority over long submarine cables of the unloaded type, and had placed with them a further order for a loaded cable from New York to Bay Roberts in Newfoundland, and for another from Bay Roberts to Sennen Cove in Cornwall. Both of those cables were in course of construction and were being loaded with the Western Electric Company's alloy. They also possessed important and valuable patent rights relating to the loading of cable conductors including a high permeability alloy known as "Mumetal," and since those patents were likely to conflict with those for a similar purpose possessed by the Western Electric Company of New York, it was thought advisable in the interests of both companies to enter into an agreement whereby the patents should be pooled on terms of equality. That agreement had now been signed, and he had no doubt that it would prove to the advantage of submarine telegraphy. The first cable actually loaded with their own alloy had been manufactured for the Eastern Extension Company in order to duplicate the cable between Perth and Cocos Island, a distance of 1,624 nautical miles, and was now being laid by their cable steamship *Colonia*. The Pacific Cable Board had resolved to duplicate its cable from Canada to Australia, and the company had secured the order for the section of the cable to be laid between Vancouver and Fanning Island, and it was to be loaded with "Mumetal." That cable, which would be the longest submarine span in the world, would be 3,625 nautical miles in length, and they hoped to have it completed in the autumn. The original cable that they had laid more than 23 years ago had never needed repairing in all those years. Their new cable ship, the *Dominia*, was a twin-screw oil-fuel steamer with a gross displacement of 9,000 tons. She was 509 ft. in length, and was fitted with all the latest machinery and appliances for laying cable. She was capable of carrying 9,000 tons of cable (approximately 3,700 miles). Loaded cable could be used for direct working at high speed over much longer distances than cable of the ordinary or unloaded type, with the result that relay stations could be dispensed with and increasingly longer spans would probably be required in the future. Referring to the retirement of Mr. Francis Lucas from the board and from the management, his Lordship remarked that Mr. Lucas joined the Telegraph Construction Company on its formation in 1864, and went to sea in the *Great Eastern* in 1865-66. He was now the sole survivor of those who took part in the voyage when the first Atlantic cable was successfully laid. As long ago as in 1874 he was first sent away in charge of a cable-laying expedition, and by the time he was appointed a managing director 20 years ago, he had laid 75,000 miles of submarine cable. The report was adopted after a short discussion.

**St. James' and Pall Mall Electric Light Co., Ltd.**

Mr. Walter Leaf (chairman) presided at the annual meeting on March 2nd, and in moving the adoption of the report and accounts (ELECTRICAL REVIEW, February 19th, p. 306), said that the past year had been one of supreme importance to the electrical industry owing to the passage of legislation for the entire reorganisation of the London electricity supply. This would form the basis of the company's operations for the next 45 years. He then outlined in some detail the general provisions of the scheme, and said that the present position was that they had submitted their schedules to the Joint Electricity Authority and had handed to the London County Council their computations of the standard price, and were awaiting a communication from those bodies. When they had come to terms a meeting would be called to reconstitute the capital of the company on a new basis. One of the changes involved in the Bill was the transfer of the Central Electric Co.'s power station at Grove Road to the London Power Co. By this the St. James' and Westminster companies would be relieved from their liability for considerable sums invested in the Central Company. Turning to the company's accounts, he said that after transferring £25,000 to the contingency fund they had £72,800 to deal with, as compared with £46,893 in 1924. That great increase was due to two causes—a fall in the cost of generation combined with a large increase in output. Although they had supplied 2¼ million kWh more, the cost of generation was actually less. This was partly due to a fall in the price of coal and partly to increased efficiency. The total cost per kWh had fallen from 0.989d. to 0.905d. Large extensions consisting of a boiler house, turbine house and pump house, to accommodate two new 15,000-kW sets and six 75,000-lb. boilers, were completed by the company's own staff during the year. Some £30,000 had been saved by this direct employment of labour. The largest of the two sets and two of the boilers were practically completed and were available for load. The third boiler was well advanced, and three additional boilers would be completed during the current year. Additional cooling towers of 20,000-kW capacity would be ready for next winter. The 22,000-V feeders linking up with the Willesden station of the Metropolitan Co. were in regular operation, and similar links with the Charing Cross and Kensington and Notting Hill companies would be completed this year. Their large increase in revenue had enabled them to consider the formation of a pension fund. Now that they had an extension of existence for 40 years from 1931, they regarded it as an obligation to establish such a fund on the usual lines. It was proposed to set £25,000 aside as a reserve for the provision of that fund as a beginning. When the question of capitalisation of their "free reserves" came up, the shareholders would be asked to devote a part of them to making a very substantial addition to the fund. The further question of an immediate reduction in charges was complicated by the fact that the Electricity Commissioners had determined that the sliding scale of prices should be effective from January 1st, 1926, and they expected shortly to have their standard price per kWh agreed. In the meantime the Board had decided to make certain reductions which would take effect from January 1st last. Any further concession which the L.C.C. might enable them to make would form the subject of a separate announcement. The report and accounts were adopted, and at a subsequent extraordinary general meeting the proposal to establish a pension fund was approved.

**Midland Counties Electric Supply Co., Ltd.**

The annual meeting was held on March 1st, Mr. George Balfour, M.P. (chairman) presiding. In moving the adoption of the report and accounts (ELECTRICAL REVIEW, February 26th, p. 346), the chairman referred to the death of Lord Chilston. He then said that the conditions under which all public service undertakings operated last year were, to say the least, difficult. Tramways, railways and power undertakings were all operating under artificial conditions, or conditions of uncertainty, due to pending legislation. Tramway undertakings had suffered from excessive omnibus competition, and the traction properties owned and operated by the company had, for the first time, made no contribution to the revenue. He believed, however, that the present conditions were only a passing phase, and that eventually the problem would be solved. Referring to the Government's electricity proposals, he said that a great deal had been said about linking up stations, and standardising frequency as a means of providing a cheap and abundant supply of power. That sort of supply could only be forthcoming if the industry was left alone and legislation confined to the protection of the public interest. Because the company had only started active development three or four years ago, and had during the last three years laid 207 miles of high-pressure lines, it might be imagined that the average price per kWh would be high. In Derbyshire and Nottinghamshire, however, it was only 0.885d., and over four counties, including Leicestershire and Warwickshire, the average price was about 1d. If companies were left to develop upon the lines laid down in their Acts, progress would be much quicker. If the company had followed the decision of the Commissioners and not proceeded with the erection of a new power station, it would have been supplying only about 1/10th of its present load. During the present session of Parliament the Leicestershire and Warwickshire Electric Power Co. was promoting a Bill empowering it to increase its capital by £500,000, and to increase its borrowing powers to 50 per cent. of the capital issued. Other clauses in the Bill related to removing the veto against overhead lines, to supplying electricity for traction purposes, &c. During the past year three Special Orders had been obtained and supplies in the districts had commenced; a further order awaited confirmation. After considerable delay the Derbyshire and Nottinghamshire Electric Power Co. had secured an Order to supply electricity in the Shardlow Rural District. The energy sold during 1925 totalled about 60,410,000 kWh inclusive of bulk supplies given by the power companies to the company's own undertakings for distribution. This represented an increase of, roughly, 14½ per cent. The number of consumers now served by the various supply companies was 8,657, as against 6,814, and the load had grown from 46,800 to 54,240 kW. During the year the installation of a 12,000-kW turbo-alternator at the Spondon station was completed; the station buildings were capable of accommodating an additional 50,000 kW. At the Avon station an additional 6,000-kW turbo-alternator and boiler plant were in course of erection, and there was sufficient room for another unit. An additional boiler plant had also been installed in the Hinckley station. During the year an issue of 250,000 ordinary shares and 250,000 preference shares was made, the capital of the company being increased to £3,000,000.

**Electrical Distribution of Yorkshire, Ltd.**

The annual meeting was held at Leeds on March 2nd, Mr. R. W. Wickham presiding. In presenting the report and accounts (ELECTRICAL REVIEW, February 26th, p. 347), he said that the large and important development which had taken place had required a capital expenditure of £245,107. The issue of 250,000 ordinary shares made last October to provide for this was very successful. That capital was, however, nearly exhausted, and another issue would be necessary before long. The chairman then reviewed the progress of the company during the 21 years of its existence. He said that the imminence of the Government proposals for reorganisation had led to the suspension of their applications for further Orders. These applications concerned 31 districts in which the local authorities had already intimated their support of the company's proposals, and seven other districts in which negotiations with the local authorities were still proceeding. He said that he could not speak as to the need for new legislation in other

parts of the country, but he considered that in the company's own area there was no need whatever for an additional organisation. If it was intended to tax one citizen to supply another with electricity at a loss, that was a political view with which he disagreed as being contrary to sound business principles. To the classes of generating and distributing companies it was proposed to add a third authority—an electricity board—which would purchase electricity from the generating authority, which would have to purchase back the energy which it had produced at a cost increased by the separate organisation. If Parliament would free the industry there was no doubt that the use of electricity would extend much more rapidly. The industry was able to finance itself and only needed reasonable facilities to increase the production and sale of electricity. The progress which had been made in the past was made in face of legislative and other difficulties, and he hoped that Parliament would not impose further fettering restrictions on the legitimate development of private enterprise.

**London and Suburban Traction Co., Ltd.**

In moving the adoption of the report and accounts at the annual meeting held on March 3rd, Lord Ashfield (the chairman) said that the company was in the same unhappy financial position as it was in a year ago. The sum available was entirely insufficient for the payment of any dividend. During 1925 the London Traffic Act had been put into force. It was the intention of the Act to give protection to tramways, and the London Traffic Advisory Committee proposed to see that that was done. A scheme had been drawn up by the Committee with a view to restricting omnibus competition on tramway routes. During last year the three tramway companies in which the company was interested had lost 10 million passengers, or over 5 per cent. of their traffic. In the meantime the workmen passengers had increased by about two millions. That increase impaired the operating efficiency of the undertakings by exaggerating the peak load traffics and reducing the average fare per passenger. He was convinced that there was a place for the tramways in the scheme of London's transport, and that that place was not a small one. As regarded the future, he said that any forecast must depend entirely upon the steps which the Minister of Transport took under the London Traffic Act. What had been done recently had encouraged him to hope that the Minister proposed to tackle this vital question of London's transport earnestly and vigorously. If that was done they might hope for better results in the future.

**Underground Electric Railways Co. of London, Ltd.**

The report for the year ended December 31st last shows total receipts of £740,445, a decrease of £53,363, and an expenditure of £62,378, a decline of £27,537, leaving net receipts of £678,067, as compared with £703 893 in 1924. A sum of £126,685 brought forward is added, and after the payment of interest on the company's 4½ per cent. bonds, the 6 per cent. first cumulative income debenture stock, and the 6 per cent. income bonds, a balance of £145,959 is carried forward. The investments have been increased by the purchase of 110,000 ordinary shares of £1 each of the North Metropolitan Electric Power Supply Co. The report shows that the balance of the Common Fund divisible among the companies forming the "Underground" group was £844.519, as compared with £819,724 in 1924. The Associated Equipment Co., Ltd., made a profit of £68,123, which, together with a balance brought in of £53,097, has been carried forward. The report states that the traffic of the tramway companies has continued to decline owing to growing omnibus competition, and the London & Suburban Traction Co. is again unable to pay its preference dividend. The report also reviews the developments in hand by the operating companies, and the Parliamentary proposals, which were dealt with in our summaries of the companies' reports. The death of Sir William M. Acworth is mentioned. The meeting was to be held yesterday (Thursday).

**Isle of Thanet Electric Supply Co., Ltd.**

Mr. A. R. Monks (chairman) presided at the annual meeting on March 1st. In moving the adoption of the report, which was reviewed in our issue of February 26th (p. 347), the chairman said that of their total revenue (£137,990), the tramway and omnibuses contributed £78,304, lighting and power £59,235, and discounts and transfer fees £451. During the year the capital expenditure amounted to £64,709, mainly upon additional plant and transmission and distribution cables. A 3,000-kW set had been installed to meet the increasing load. As their capital expenditure during the next year or so would be heavy they proposed to increase the capital to £500,000. Applications for new connections continued to come in at a satisfactory rate, and a supply was now being given in Birchington and Westgate which should lead to increasing revenue. The report and accounts were approved, and at a subsequent extraordinary meeting a resolution was passed for the raising of the company's capital.

**Durelco, Ltd.**

The report for the year ended September 30th, 1925, shows that after writing £545 off debenture expenses there was a loss of £1,345. The company is a holding concern dependent for its income on its subsidiaries. The combined profit of the latter, before providing for debenture interest, &c., was £20,000. Cryselco, Ltd., is said to have earned enough to pay a 10 per cent. dividend on its capital. Duram, Ltd., experienced a record year. Debenture interest and sinking fund absorb nearly £8,500 a year, and this, together with the generally difficult trading conditions, make it incumbent upon the directors to conserve the cash position of the subsidiary companies, and no dividends have therefore been received from these. At the annual meeting on March 4th, the chairman (the Earl of Kintore) said that both Duram, Ltd., and Cryselco, Ltd., had done well during the year. The financial position was being strengthened year by year. Steps had been taken to reorganise the capital of Duram, Ltd., with a view to writing down certain items.

**Oxford Electric Co., Ltd.**

The balance to the credit of the revenue account for 1925 is £50,112 (including £2,302 brought forward), and after providing for interest, &c., there remains £44,825. It is proposed to place £33,000 to reserve and renewal of plant account, and to pay a dividend at the rate of 7 per cent. on the ordinary shares (2½ per cent. already paid), leaving £2,075 to be carried forward. The directors recommend the division of the £5 ordinary and preference shares into £1 shares, and also the increasing of the capital by the creation of 75,000 6 per cent. cumulative preference shares of £1 each. At the same time it is proposed to raise the present preference dividend from 5 to 6 per cent., and to offer the new shares and the existing 20,000 unissued preference shares to the ordinary shareholders, in the first place. The meeting was to be held yesterday (Thursday).

**Smithfield Markets Electric Supply Co., Ltd.**

The annual meeting was held on February 25th. Sir H. S. Leon, Bart., who presided, first referred to the death of Mr. Browne Martin, a director, and then, turning to the accounts, said that the profit showed an increase of about £870 and the amount carried forward was £300 higher. The cash reserves had been increased by £9,000, and the financial position was extremely satisfactory. The company was not affected by the recent legislation and, with reduced charges, it was hoped to at least maintain the present output and show good results. In reply to a shareholder, who thought that the dividend might have been higher, the chairman said that it was the board's policy to provide a reserve fund which would enable them to repay the share capital at par if the City Corporation decided to purchase the undertaking in 1932.

**Kensington and Knightsbridge Electric Lighting Co., Ltd.**

The report for 1925 records a net profit of £29,363, which together with £16,871 brought forward, gives an available balance of £46,234. Interim dividends absorbed £8,625, and it is proposed to deal with the balance (£37,609) as follows: To reserve for employés' superannuation, £10,000; preference dividends, £2,125; final dividend of 10s. per share on the ordinary shares (making 15 per cent. for the year), £10,500; leaving £14,984 to be carried forward. In common with the reports of other London companies, the report makes reference to the reorganisation schemes and states that the directors are taking steps to carry out the arrangements embodied in the London Electricity (No. 2) Act, 1925. The sum of £10,000 reserved for employés' superannuation is an initial sum. The meeting is to be held on March 18th.

**German Companies.**

The *Bavarian Telephone Works Co.*, of Munich, has carried forward the net profits of 6,300 marks earned in 1924-25.

The *Electric Supply Co., of Berlin*, reports that the net profits increased from 1,754,000 marks in 1924, to 2,078,000 marks last year, and the rate of dividend is advanced from 8 to 9 per cent.

The *Electric Light & Power Investments Co.*, of Berlin, which was unable to pay a dividend for 1924, proposes to distribute 8 per cent. for last year out of net profits amounting to 1,540,000 marks. The directors state that the associated manufacturing companies had a larger turnover, as compared with the preceding year and before the war, although the works were not producing at their full capacity, owing to the unfavourable general economic situation, as well as to taxes and social burdens.

**French Companies.**

The directors of the *Etablissements Electro-Industriels E. Rabet*, of Vessoul, report that the net profits for the six months ended with last December amount to 161,000 fr.

The *Compagnie Générale Parisienne de Tramways* reports net profits of 3,231,000 fr. for 1925, as compared with 3,091,000 fr. in the previous year. The priority shares are to receive a dividend at the rate of 16 fr. per share, the ordinary shares one of 13.50 fr., and the preference shares one of 3.50 fr. per share.

*La Société de l'Energie Electrique du Nord de la France*, of Paris, is increasing its capital from 70 to 100 million fr.

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**Spanish Companies.**—The *Electra del Lima* concern, which belongs to a group of Spanish electrical companies, has issued over 16½ million pesetas in 6 per cent. bonds for the purpose of completing and extending its power and light works in Portugal, especially at Oporto.—*Reuter's Trade Service* (Madrid).

**Cambridge Electric Supply Co., Ltd.**—The report for the past year shows a total profit of £33,807. Out of this the directors have placed £15,000 to the depreciation fund and £10,000 to reserve, and recommend a dividend of 7 per cent. for the year, leaving a balance of £5 097 to be carried forward. To meet the demand the company has provided, and is providing, additional plant. It has been established that the Cambridge Corporation cannot acquire the company's works until 1935. The company successfully petitioned against the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Bill last session and secured a protecting clause. The report states that charges have not been reduced. The meeting is to be held on March 17th.

**Stock Exchange Notices.**—Dealings in the following have been specially allowed by the Committee under Rule 159:—

Ever-Ready Co. (Great Britain).—49,800 new ordinary shares of £1 each, fully paid, Nos. 449,601 to 498,800.

Isle of Thanet Electric Supply Co.—72,000 new six per cent. cumulative participating preference shares of £1 each, 10s. paid, Nos. 210,001 to 282,000.

Singapore Traction Co.—71,469 ordinary shares of £1 each, fully paid, Nos. 93,740 to 165,208; 47,110 seven per cent. cumulative preference shares of £1 each, fully paid, Nos. 152,891 to 200,000.

The undermentioned have been ordered to be officially quoted:—

Singapore Traction Co.—71,469 ordinary shares of £1 each fully paid, Nos. 93,740 to 165,208, and 47,110 7 per cent. cumulative preference shares of £1 each fully paid, Nos. 152,891 to 200,000.

**Liverpool Overhead Railway Co.**—The annual meeting was held on March 4th, Mr. T. D. Killey presiding. After the chairman had moved the adoption of the report shareholders criticised the board on account of its being again unable to pay an ordinary dividend. The chairman said that the success of the undertaking was dependent upon activity at the port, and prospects were much improved. A shareholder considered that the company would save considerable expense if a less frequent service was instituted. The board agreed to meet the shareholders in three months' time to discuss the position of the company, and a committee of three shareholders was appointed for that purpose.

**London United Tramways, Ltd.**—In the course of his speech at the annual meeting on March 3rd, the chairman (Mr. H. A. Vernet), referring to the deficiency of £29,149 incurred by the company, said that unless some measure of protection was afforded the company it could not continue to carry on. On the Uxbridge-Shepherd's Bush route omnibus competition had increased by no less than 550 per cent. since 1922. If they had to cease running what would be done for the 56,294,000 passengers who availed themselves of the company's services in the past year, 7½ millions of whom held workmen's tickets?

**Commonwealth Edison Co.**—The operating revenue for 1925 amounted to $58,691,583, and the net operating revenue to $22,429,174. After meeting various charges and adding other income of $937,239, there was a gross income of $15,867,905. The amount available for dividends was $10,766,786, and after paying these a balance of $3,563,844 was carried to surplus. The report states that the business expanded during the year. The amount of energy sold rose by about 11 per cent. to 3,091,424,000 kWh.

**Ever-Ready Co. (Great Britain), Ltd.**—At an extraordinary general meeting, held on March 1st, Mr. M. Goodfellow presiding, a resolution was adopted authorising the capitalisation of £49,800 of the undivided profits of the company. The chairman said that there was an increasing demand for their batteries, and new avenues for further expansion were constantly being sought. The liquid resources of the company were very strong, and they proposed to issue the new capital in the form of £1 shares to the ordinary shareholders.

**Mackay Companies.**—The report for 1925 records an income from investments of $4,801,207. Regular quarterly dividends at the rate of 4 per cent. per annum on the preferred shares and 7 per cent. on the common shares have been paid. It is stated that the operating companies' business has continued to expand despite the competition of other methods of communication. The investments are valued at $94,294,549, against liabilities of $768,808. The issued capital is $91,380,400, giving a surplus of $2,145,341.

**Shawinigan Water and Power Co.**—The gross earnings during 1925 amounted to $6,702,034 and the net receipts to $2,366,338, as compared with $2,045,899 in 1924. After making the usual allocations and paying dividends at the rates of 7 per cent. for the first six months of the year and 8 per cent. for the latter half, a balance of $573,246 is carried forward. The working capital is shown at $3,398,083, as compared with $1,649,979 at the close of 1924.

**Bell Telephone Co. of Canada.**—The net operating revenues for 1925 amounted to $5,897,964, an increase of $361,150. In spite of this, however, the final result was a deficit of $8,712, as compared with a credit balance of $552,057 in the preceding year. The difference was due to a larger amount paid out in dividends.

**Italian Company.**—*La Società Italiana Metallurgica-Elettrolitica*, of Milan, is increasing its capital from 4,500,000 to 7,255,000 lire.

**British Insulated Cables, Ltd.**—A final dividend of 5 per cent. and a bonus of the same amount have been declared on the old ordinary shares, making 15 per cent. for the year. The new (bonus) ordinary shares are to receive a 5 per cent. dividend and a 5 per cent. bonus, making 10 per cent. £408,333 is transferred to reserve and depreciation, and £224,000 is carried forward.

**W. Canning & Co., Ltd.**—The report for the year ended December 31st last shows a profit of £43,297, to which is added £6,697 brought forward, making £49,994. It is proposed to pay a dividend of 10 per cent. and a bonus of 6d. per share upon the ordinary shares, to transfer £15,000 to reserve, to allocate £1,000 to the employés' benevolent trust fund, and to carry forward £4 228. The 1924 dividend was 10 per cent. Meeting: March 15th.

**Davis & Timmins, Ltd.**—The net profit for 1925 was £17,998, and to this is added £24,799 brought forward, making £42,796. A final dividend at the rate of 10 per cent., free of tax, is recommended on the ordinary shares (making 8 per cent., tax free, for the year), plus a bonus of 17 per cent., free of tax. A similar distribution was made in 1924. The carry-forward is £24,588.

**India Rubber, Gutta Percha and Telegraph Works Co., Ltd.**—The list for public applications for the issue of £400,000 five per cent. first mortgage debentures to bearer was closed at 11 o'clock on Saturday morning. Applications for renewals by existing debenture holders up to the amount of their present holdings must be received not later than March 15th.

**Midland Electric Corporation for Power Distribution, Ltd.**—A final dividend of 5 per cent., and a bonus of 5 per cent. are recommended on the ordinary shares, making a total distribution of 15 per cent. for the year, as in 1924. The directors propose to offer 70,000 new £1 ordinary shares to present shareholders at par.

**Reduction of Capital.**—ARMORDUCT CABLE CO., LTD., AND REDUCED.—A petition for the confirmation of the reduction of capital of this company from £10,100 to £2,341 has been presented to the High Court, and will be heard in London on March 16th.

**City of London Electric Lighting Co., Ltd.**—The directors recommend the payment of final dividends on the 6 and 8 per cent. cumulative preference shares, and one of 2s. per share on the ordinary shares, making 15 per cent. for the year.

**Vickers, Ltd.**—The final dividends have been declared on the preferred stock and preference shares, but no dividend is to be paid on the ordinary shares which were recently reduced from £1 to 6s. 8d. each.

**Clarke, Chapman & Co., Ltd.**—A final dividend of 2½ per cent. has been declared on the ordinary shares, making 5 per cent. for the year. £6,259 is transferred to reserve and £2,192 carried forward.

**Western Telegraph Co., Ltd.**—The directors have declared the second quarterly interim dividend of 5s. per share, free of tax, for the year ending June 30th, 1926, being at the rate of 10 per cent. per annum.

**Globe Telegraph and Trust Co., Ltd.**—The usual quarterly dividend of 1¼ per cent. has been declared on the ordinary shares.

**Brazilian Traction, Light and Power Co., Ltd.**—A quarterly dividend of 1½ per cent. has been declared on the preference shares.

**Eastern Telegraph Co., Ltd.**—Final dividend for the year ended December 31st, 1925, of 2½ per cent. free of tax, on the ordinary stock, making 10 per cent. free of tax.

**Eastern Extension, Australasia and China Telegraph Co., Ltd.**—Final dividend for the year 1925 of 5s. per share, free of income tax.

**Central Electric Supply Co.**—The £800,000 5½ per cent. secured and guaranteed notes will be redeemed at par on April 1st.

**British Columbia Electric Railway Co., Ltd.**—The company is making an issue, for public subscription in Canada, of $1,500,000 six per cent. preferred stock.

## Stocks and Shares.

MONDAY EVENING.

NEW YORK has been passing through a financial panic and subsequent recovery, which have left their mark upon prices of various utility stocks and shares in companies that operate in Mexico, Canada and Brazil. So far as active interest amongst investors in this country went, Brazilian Tractions provided the most interesting storm centre. The price fell from 97 to 91, rallying sharply to 94. Points were sheared off the prices of Montreal Light, Heat & Power, Pennsylvania Water, Shawinigan, and others of this description. American Telephones gave way and there was a general offering amongst American industrials of all kinds, following the slump which

overtook the shares of the United States railroad companies. As soon as the force of the panic had blown itself out, reaction set in, and prices swung up again. The effect of this particular excitement on London might have been disastrous had there been any open account on this side in American shares, but, interest being so limited, the proceedings from Wall Street have been watched with an attention mainly academic.

The City of London Electric Lighting Co. has announced a final dividend of 2s., making 15 per cent. for the year, and this completes the tale of the dividend announcements by the London electricity supply companies. In every case the distribution is to be at the same rate as that for 1924. The directors evidently consider it judicious to fortify reserves, and to strengthen the financial position of the companies, rather than to distribute earnings upon the scale which they could have done had they chosen to have been less conservative. The prudent policy is likely to turn out the best for shareholders. Anticipation now looks forward to the time when the capitals shall be re-organised in accordance with the terms of the Bills passed by Parliament last year. London Power 5 per cent. debenture stock has risen to 7/16 premium, and is likely to go better when the stock is settled into permanent investment hands.

The India Rubber, Gutta Percha & Telegraph Works Co. has offered £400,000 5 per cent. first mortgage debentures to bearer at 93, redeemable 1936. This issue is made solely for the purpose of repaying an existing amount of similar extent. Holders of the expiring debentures receive preference in allotment and £" difference between the redemption price of their existing stock and the issue price of the new. No underwriting was considered necessary, and this confidence became justified by prompt over-subscription of the stock.

Changes in the prices of electricity supply shares are almost negligible. The only alteration that is worth noting is a rise, in partial recovery of the dividend, in St. James' & Pall Mall shares to 15¼. London Electric preference are a shade harder, and the ordinary shares at 32s. are also a little better, allowing for deduction of the dividends in both cases. Midland Counties ex dividend are 22s. 3d. The Midland Electric Corporation for Power Distribution is about to offer 70,000 new ordinary shares to its proprietors in the proportion of one new share for every four shares held. The existing price of the old shares is 53s., and the company's 7 per cent. preference stand at 25s. middle. Metropolitans remain at 39s. 6d., the dividend being at the rate of 16 per cent., to make 11 per cent. for the year, the same as that for 1924. The net receipts for the twelve months show an increase of £31,000.

Underground Railway stocks are steady, Metropolitans and Districts being quoted ex dividend last week. Taking these deductions into account, the prices are but little changed. The fear of an engineers' lock-out and a strike in certain other trades are deterrents against investment and speculation in Home Railway stocks. Underground Electric ordinary and "A" shares are both firmer. The company's report shows that net receipts for last year were £678,000 against £703,000 in the year before. Substantial economies were effected in expenditure, but the traffic showed a decline, not very surprising in view of the fact that the figures went against those of the first Exhibition year.

Cable stocks and shares are neglected, an eighth fall in Western Telegraphs being offset by a similar improvement in Eastern Extensions. It is worth noticing that the latter now stand 7s. 6d. higher than Westerns Both companies pay the same dividends, namely, 10 per cent. for the year, the Western having declared its usual quarterly distribution a few days ago. Eastern ordinary remains at 177½. Chili Telephones are 5/16 up at 6¼, the rest of the telephone group holding its prices.

Wireless shares are dull, and, although Marconis are called nominally 23s. 9d., the market in them is heavy. Burndept preferred strengthened to 15s. 9d. Radio Corporation Common fell to 6¼ on the slump in New York, but recovered part of the drop, being now quoted at 7¼. The preferred are 9¼ xd. Telephonic communication having been established with New York, the Stock Exchange and Wall Street markets can exchange vocal greetings. Business between the two centres has yet to revive.

Amongst manufacturing shares, Edison-Swans gave way to 8s. 6d. Electric Constructions are lower at 32s. 6d., English Electrics weakened to 19s. 6d., Brush to 27s. General Electric ordinary and preference are both down. The disposition has been to let prices droop in the absence of fresh support from investment, and the apprehension of renewed strikes. British Insulated continue steady at 3, on the dividend and bonus, making 15 per cent., the same as last year, when, however, the capital was considerably less than it is to-day. It may be recalled that the British Insulated distributed a share bonus of 33⅓ per cent. some few months ago.

The engineering group is marking time, with Babcocks 53s. 9d. Rubber shares are in a state of suppressed excitement. The panic in America caused a drop in the price of the raw stuff, but, in spite of this, buyers of shares came forward on this side, and the market looks more cheerful than it has done for the last few weeks There is a noticeable demand for shares in the best class companies, and with rubber close to half-a-crown per lb., confidence is beginning to return.

# Share List of Electrical Companies.

### Home Electricity Companies.

| | Nom. | Dividend. 1925 | Dividend. 1924. | Price Mar. 8, 1926. | Rise or fall. | Yield. p.c. |
|---|---|---|---|---|---|---|
| | £ | | | | | |
| Bournemouth and Poole ... ... | 1 | 13 | 14 | 62/- | — | 4 10 4 |
| Brompton Ordinary ... ... ... | 1 | 10 | 10 | 1½ | — | *5 18 6 |
| Charing Cross Ordinary ... ... | 1 | 14½ | 15 | 45/9 | — | 6 11 2 |
| do. do. 4½ Pref. ... | 1 | 4 | 4½ | 17/- | — | 5 5 11 |
| Chelsea ... ... ... ... ... | 1 | 12 | 12 | 2½ | — | 5 12 11 |
| City of London ... ... ... | 1 | 15 | 15 | 47/- | — | 6 7 8 |
| do. do. 6% Pref. ... ... | 1 | 6 | 6 | 22/6 | —6d. | 5 6 8 |
| Clyde Valley ... ... ... ... | 1 | 8 | 8 | 30/- | — | 5 6 8 |
| County of London ... ... ... | 1 | 15 | 15 | 60/- | — | 5 0 0 |
| do. do. 6 % Pref.... ... | 1 | 6 | 6 | 22/- | — | 5 9 1 |
| Edmundson's Ordinary ... ... | 1 | 7 | 7 | 24/- | — | 5 16 8 |
| do. 7% Pref. ... ... | 1 | 6 | 7 | 22/6 | — | 6 4 8 |
| Elec. Supply Corporation ... ... | 1 | 10 | 10 | 32/6 | — | 6 3 0 |
| Kensington Ordinary ... ... | 5 | 14 | 15 | 14¼ | — | 5 5 3 |
| Lancs. Light and Power ... ... | 1 | 7½ | 7½ | 27/- | — | 5 11 1 |
| London Electric ... ... ... | 1 | 10 | 10 | 32/-xd | +6d. | 6 5 0 |
| do. do. 6% Pref. ... ... | 5 | | 6 | 5⅝xd. | +1/8 | 5 11 7 |
| Metropolitan ... ... ... ... | 1 | 10 | 11 | 38/6 | — | 5 11 4 |
| do. 4½% Pref. ... ... | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Midland Counties ... ... ... | 1 | 5½ | 6 | 22/3xd. | — | 5 7 10 |
| Newcastle-on-Tyne Ordinary ... | 1 | 6 | 7 | 23/9 | — | 5 17 11 |
| do. 5% Pref. ... | 1 | 5 | 5 | 18/9 | — | 5 6 8 |
| do. 7% Pref. ... | 1 | 7 | 7 | 25/- | — | 5 12 0 |
| Notting Hill 6% Pref. ... ... | 10 | 6 | 6 | 9½ | — | 6 6 4 |
| North Met. Elec. 6% Pref.... ... | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| St. James' and Pall Mall ... ... | 5 | 17½ | 17½ | 16¾xd. | +¼ | 5 13 10 |
| South London... ... ... ... | 1 | 15 | 15 | 2⅞ | — | 5 17 1 |
| South Metropolitan Pref. ... ... | 1 | 7 | 7 | 1⅞ | — | 5 6 8 |
| Urban Ordinary ... ... ... | | | | 19/6 | — | 4 2 1 |
| do. 6% Pref. ... ... | 1 | 6 | 6 | 1 | — | 6 0 0 |
| Westminster Ordinary ... ... | 1 | 15 | 15 | 45/-xd. | — | 6 13 4 |
| Whitehall Elec. Invst. 7½% Pref.... | 1 | 7½ | 7½ | 20/3 | — | 7 8 2 |
| Yorkshire Elec. ... ... ... | 1 | 8 | 8 | 29/- | — | 5 10 |

### Home Rails.

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented ... | Stock | 4 | 4 | 68 | — | 5 17 8 |
| Metropolitan ... ... ... ... | ,, | 4 | 5 | 66½xd. | +½ | 7 10 5 |
| do. District ... ... ... | ,, | 3½ | 3½ | 46xd. | — | 7 12 2 |
| Underground Electric Ordinary ... | 10 | Nil | Nil | 2½ | +¼ | Nil |
| do. do. "A" ... | 1/- | Nil | Nil | 8/- | +6d. | Nil |
| do. do. Income ... | Bonds | 6 | 6 | 97xd. | — | *6 3 9 |

### Telegraphs and Telephones.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref. ... ... | Stock | 6 | 6 | 102 | — | 5 17 8 |
| do. Def. ... ... | ,, | 1½ | 1½ | 23½ | — | 6 6 4 |
| Automatic Telephone ... ... | 1 | 3 | 6 | 52/- | — | 2 6 2 |
| Chili Telephone ... ... ... | 5 | 6 | 5 | 6⅝ | +5/16 | *3 12 9 |
| Cuba Sub. Ord. ... ... ... | 10 | 5 | 5 | 6¾ | — | 7 8 2 |
| Eastern Extension ... ... ... | 10 | 10 | 10 | 18½ | +½ | *5 10 4 |
| Eastern Tel. Ord. ... ... ... | Stock | 10 | 10 | 177½ | — | *5 12 8 |
| Globe Tel. and T. Ord. ... ... | 10 | 10 | 10 | 18½ | — | *5 9 7 |
| do. do. Pref. ... ... | 10 | 6 | 6 | 10⅝ | — | 5 10 4 |
| Great Northern Tel. ... ... ... | 10 | 22 | 22 | 32 | — | 6 17 6 |
| Indo-European ... ... ... | 25 | 7 | 8½ | 45½ | — | *4 13 5 |
| Marconi... ... ... ... ... | | 10 | 10 | 23/9 | — | 8 8 6 |
| Marconi Marine ... ... ... | 1 | 10 | 7½ | 20/- | — | 7 10 0 |
| Oriental Telephone Ord. ... ... | 1 | 12 | 12 | 2½ | — | *5 12 11 |
| United R. Plate Tel.... ... ... | 5 | 8 | 8 | 7⅞ | — | 5 1 7 |
| Western Telegraph ... ... ... | 10 | 10 | 10 | 17¾ | —¼ | *5 12 8 |

### Home and Foreign Trams, &c.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. ... | 5 | 5½ | 5½ | 8⅝ | — | 8 12 6 |
| do. do. 2nd Pref. ... | 5 | 6 | 6 | 9⅞ | —⅛ | 10 8 8 |
| do. do. 5% Deb. ... | Stock | 5 | 5 | 73½ | — | 6 16 8 |
| British Electric Traction Ord. ... | ,, | 6 | 6 | 117½ | — | 5 2 2 |
| do. do. 6% Pref. ... | , | 6 | 6 | 107 | +1 | 5 12 2 |
| Brazil Traction ... ... ... | 100 | 4 | 4 | 94 | —3 | 5 6 5 |
| Brit. Columbia Elec. Rly. Pce. ... | Stock | 5 | 5 | 84½ | — | 5 18 4 |
| do. do. Preferred ... | ,, | 9/6- | 9/6- | 109½ | — | *4 11 9 |
| do. do. Deferred ... | ,, | 129/5 | 129/5 | 127 | — | *5 2 7 |
| do. do. Deb. ... | ,, | 4¼ | 4¼ | 78 | —1 | 5 9 0 |
| London & Sub. Trac. 5% Pref. ... | 1 | 2½ | Nil | 5/6 | +6d. | Nil |
| London United Tram. Deb. ... | Stock | 4 | 4 | 48 | +3 | 8 6 8 |
| Mexico Trams, 5% Bonds ... ... | — | 5 | 5 | 60½xd. | — | 8 5 4 |
| Mexican Light Common ... ... | 100 | Nil | Nil | 39½ | — | Nil |
| do. Pref. ... ... | 100 | Nil | Nil | 64½ | — | Nil |
| do. 1st Bonds ... ... | — | 5 | 5 | 69½ | — | 7 3 11 |
| Yorkshire (West Riding) ... ... | 1 | 5 | — | 15/-xd. | +6d. | 6 13 4 |

### Manufacturing Companies.

| | | | | | | |
|---|---|---|---|---|---|---|
| Babcock & Wilcox ... ... ... | 1 | 12 | 12 | 21½ | — | *4 9 5 |
| British Aluminium Ord. ... ... | 1 | 5 | 10 | 38/9 | — | 5 0 2 |
| British Elec. Transformer Pref. ... | 1 | Nil | 7 | 26/9 | — | 6 14 11 |
| British Insulated Ord. ... ... | 1 | 15 | 15 | 3 | — | 5 0 0 |
| Brush Ord. ... ... ... ... | 1 | 10 | 10 | 27/0 | —6d. | 7 8 2 |
| Callenders ... ... ... ... | 1 | 15 | 15 | 3½ | — | 4 5 9 |
| do. 6½% Pref.... ... | 1 | 6½ | 6½ | 22/6 | — | 5 15 7 |
| Crompton Ord. ... ... ... | 1 | Nil | Nil | 16/3 | — | ... ... |
| Edison-Swan ... ... ... ... | 4/- | 10 | 10 | 8/6 | —6d. | 4 14 1 |
| do. 5% Deb. ... ... | Stock | 5 | 5 | 83 | — | 6 0 6 |
| Electric Construction ... ... | 1 | 10 | 10 | 3/6 | —1/8 | 6 3 1 |
| Enfield Cable, Pref. ... ... ... | 1 | 7½ | 7½ | 1½ | — | 6 0 0 |
| English Electric ... ... ... | 1 | 5 | 5 | 19/6 | —2d. | 5 2 7 |
| do. do. Pref. ... ... | 1 | 6 | 6 | 20/- | —6d. | 6 0 0 |
| Gen. Elec. Pref. ... ... ... | 1 | 6½ | 6½ | 23/6 | —6d. | 5 10 8 |
| ,, Ord. ... ... ... | 1 | 5 | 7½ | 31/3 | —9d. | 4 16 0 |
| Henley ... ... ... ... ... | 1 | 15 | 16 | 3⅜ | — | 4 8 3 |
| do. 4½% Pref. ... ... ... | 5 | 4½ | 4½ | 4½xd. | +2/- | 5 6 0 |
| India-Rubber... ... ... ... | 1 | 5 | 5 | 1¼ | — | *4 0 0 |
| Johnson & Phillips ... ... ... | 1 | 10 | 10 | 2⅛ | — | 3 8 3 |
| Met.-Vickers, Ord. ... ... ... | 1 | 8 | 8 | 27/- | — | 5 18 6 |
| do. Pref. ... ... ... | 2 | 8 | 8 | 2⅞ | — | 6 11 3 |
| Siemens Ord. ... ... ... ... | 1 | — | 7½ | 31/3 | — | 4 16 0 |
| Telegraph Construction ... ... | 12 | 20 | 10 | 29 | — | *4 2 9 |

*Dividends paid free of Income Tax.

# The Ideal Home Exhibition.—II.

## Electrical Features at Olympia.

In this issue we are able to reproduce some views of the "Electric House" which has been arranged at Olympia by the British Electrical Development Association (*vide* our last issue, p. 403). These give a good impression of what an all-electric home should be, and contrasted with Mid-Victorian "horrible examples" (for which we have no space) the brightness and atmosphere of well-being of the apartments are considerably enhanced. The first view shows the exterior, which is attractively decorated, with a specially dressed bay window, an electrical "address," and a small lawn with an electric mower. Fig. 2 depicts the laundry and is illustrative of the labour-saving attributes of electricity. Fig. 3 shows the bathroom and exemplifies the convenience and cleanliness of electrical

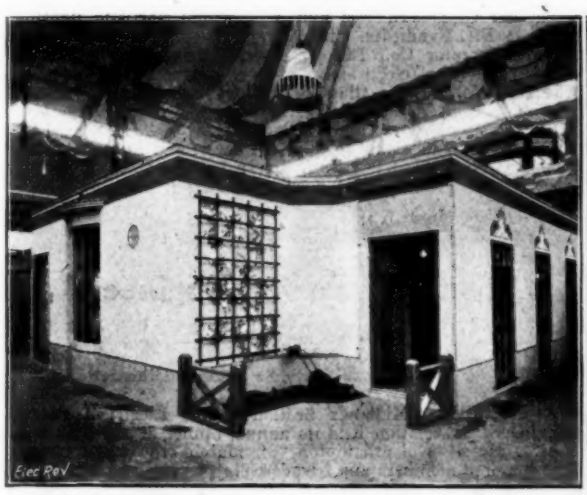


Fig. 1.—An Exterior View.

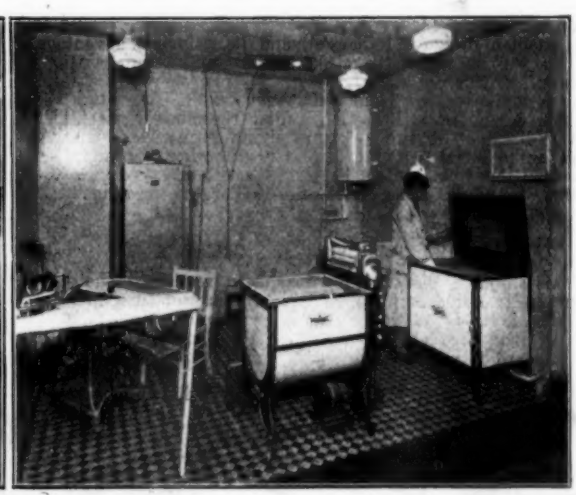

Fig. 2.—The Laundry.

Fig. 3.—The Bathroom.

Fig. 4.—The Sitting Room.

**The Electric House at Olympia.**

methods. The comfort of an electric home is impressed upon the visitor by the sitting room, illustrated in fig. 4, with its imitation coal fire, ample light where it is needed, a fan, and a splendid radio set. One feature which will be noticed is the switch plug fitted beneath the table, which eliminates the flexible lead from the lampholder which is usually required if table appliances are employed The Electric House is one of the main attractions of the Exhibition, and we are bound to remark that it is the only electric house there. There are again a number of attractive model residences open to the public, but, as usual, the only application of electricity appears to be lighting. On the other hand, among the "Kitchens of All Nations" which have been arranged in the gallery there is an American type in which an electric cooker has been installed. Generally speaking, the part played by electrical firms in this year's exhibition is a larger and more attractive one. The following notes indicate the principal electrical features which are to be seen :—

### Hotpoint Electric Appliance Co., Ltd.

A wide variety of apparatus is displayed by this company. Among the appliances shown is the new "Falconette" cooker, which is very suitable for small dwellings. It has an oven measuring 9 in. by 10½ in. by 12 in., with a drop-down front. There is a bottom element and another one in the top which serves both for the oven and as a grill. The total loading is 3,000 W. A device which we think is new to this country is the "Toastmaster" (American) timed toasting appliance. Several designs are shown, but the main features are levers which lower the bread into the body of the appliance, and at the same time switch on. There is a timing device graduated in seconds, and until this is set the levers will not remain down. When the toasting time has elapsed the levers are released and bring the bread out. Another type of cooker shown is fitted with the new "quick-service" boiling rings which can be substituted for the older patterns. An "Aerobell" washer, "Premier-Duplex" vacuum cleaners, toasters, kettles, irons, fires, &c., are also on view.

### L. G. Hawkins & Co., Ltd.

This company again has a very comprehensive display of electric lighting, heating, cooking and labour-saving appliances. The lighting fittings, especially, are of a very high order, and comprise electroliers, standards, bowls, &c., of excellent glass and metal work. The appliances are too numerous to mention separately; it will suffice to say that there are few of the familiar devices absent. A part of the stand has been made into a small demonstrating theatre. There is seating accommodation, and upon a dais is mounted

a model electric kitchen in which Ald. Mrs. Hammer and Mrs. Pearmain, of Hackney, show and explain the use of the "Universal" cooker.

**Belling & Co.**

Electric fires form the main part of this exhibit. Several examples of "period" styles, including "Jacobean" and "Adam" patterns, are shown, and they are all of handsome appearance. A lighter reflector type appears, consisting of a sheet metal body with a coppered reflector, below which the elements are mounted horizontally. An effective contrast has been arranged between an electric fireplace and one of the ordinary coal variety with its concomitants of dust and trouble. Examples of double fires in art metal are also exhibited. The cooking exhibit includes a standard range with plug-in elements and a separate grilling and boiling table. Each element is controlled by a three-heat switch mounted on a separate board. Water-heating apparatus, kettles, irons, hotplates, and other appliances complete the exhibit.

**Dowsing Radiant Heat Co., Ltd.**

This company's show is also a widely-varied one ranging from an electric cooker to a cigarette lighter. The cooker is a Canadian design (McClary's), and its principal advantage is the way in which the elements are clipped into position. Apart from this the appliance is of very handsome appearance, and is mounted on legs of convenient height. The oven has a drop-down front, in which a dial thermometer is fitted. The "Sunrae" carbon arc lamp giving ultra-violet radiation and an artificial sunlight projector are other exhibits. In addition there are radiant heaters ("sausage" type), kettles, irons, branding irons, violet-ray apparatus, sealing wax heaters, glue pots, and many other appliances.

**Standard Telephones and Cables, Ltd.**

This stand is divided into two main sections. The first contains two sideboards upon which are arranged a number of electric table appliances—urns, percolators, toasters, &c., while upon the carpet with which the floor is covered the "Standard" vacuum cleaner is demonstrated. The other half is arranged as a model laundry in which are two "Western Electric" washing machines, an ironer and irons; these are continuously demonstrated.

**International Electric Co., Ltd.**

Intercommunication and other telephone equipment is shown by the company, including mining and G.P.O. automatic telephones. A radio receiving set and a new type of loud speaker are other exhibits.

**Francis Polden & Co., Ltd.**

A selection of Best & Lloyd lighting fittings is one of the notable features of this stand. In addition, the company shows examples of the "Frigidaire" refrigerator and the compact "Delco-Light" small generating set. Other exhibits are "Hoover" vacuum cleaners, electric fires of many patterns, portable radio sets, irons, kettles, and other domestic appliances.

**Read & Morris, Ltd.**

The speciality of this company is a radio receiver which works from d.c. mains and thus dispenses with batteries. A typical example shown is a 3-valve hospital receiver which is being supplied to the Millbank (military) Hospital under the *Daily News* scheme. The installation is capable of working 350 pairs of 'phones and seven loud speakers. Other sets on view are a 5-valve set with a loud-speaker range of 2,000 miles and a domestic set for use on d.c. mains.

**Thorn & Hoddle, Ltd.**

A part of this stand is arranged as a country residence power house. In it are a small "Pelapone" lighting set, together with an appropriate battery and switchboard. Another notable exhibit is a larger "Pelapone" set giving from 100 to 140 A at 80 V. Lighting fittings are also shown.

**S. G. Brown, Ltd.**

A fine collection of loud speakers appears on this stand. Among them are examples of instruments with beautifully-produced mahogany trumpets, cabinet patterns, "Crystavox" speakers for use with crystal sets, &c. An outstanding exhibit is the "P.Q." loud speaker with a long straight horn, designed for demonstration and outdoor purposes.

**Electrolux, Ltd.**

This company shows for the first time at an exhibition the ingenious refrigerating apparatus described in our issue of February 26th (p. 327), as well as the more familiar "Electrolux" vacuum cleaner.

**Reliance Telephone Co., Ltd.**

Two patterns of automatic telephone exchanges are to be seen on this stand, as well as many examples of intercommunication telephones of wall and desk patterns and different designs, and the "Cannon" burglar alarm, an electrical relay system.

**Hammond Bros. & Champness, Ltd.**

Among a display of lift equipment this company shows a working service lift fitted with push-button control.

**Delco Light Co.**

A number of examples of "Frigidaire" units and refrigerating cabinets are shown by this firm, in addition to its well-known "Delco-Light" small generating set.

**Hurley Machine Co.**

This firm shows the popular "Thor" washers in operation, both the revolving-cylinder and vacuum cup types, in addition to ironers and vacuum cleaners.

**Beatty Bros., Ltd.**

This company also has an electric washing display employing "White Cap" and "Red Star" washing machines and an ironer.

**Other Exhibitors.**

The following concerns also have stands at the Exhibition:—Electric Appliances Co., Ltd. ("Eureka" vacuum cleaners); Venetian Glass Galleries and A. Martelli (artistic lighting bowls); B.I. Syndicate, Ltd. ("Astro" reflectors); Mechanical Refrigerator Co., Ltd. (electrically-driven refrigerators); I. Calvete, Ltd. (electro-medical apparatus); British Vacuum Cleaner Co., Ltd. (the "Turbinet" electric vacuum cleaner); Hoover, Ltd. (vacuum cleaners); Betax Mfg. Co., Ltd. (fans, vibrators, bowl fires, &c.); A. W. Gamage, Ltd. (washing machines and vacuum cleaners); and Singer Sewing Machine Co., Ltd. (electrically-driven machines).

The Exhibition remains open until March 27th.

# Electrical Power Engineers' Association.

**N.W. Midlands Section: Annual Dinner.**

THE North-West Midlands Section of the Electrical Power Engineers' Association held its annual dinner at the Star and Garter Hotel, Wolverhampton, on March 3rd, when nearly one hundred members and friends were present, and Mr. D. J. Duffy, chairman of the Section, presided.

Mr. F. FORREST in proposing "The Association" conveyed a message of greeting from the president of the Institution of Electrical Engineers, who was unable to be present. In referring to the proposed national electricity scheme, he suggested that the Association would have to watch the Bill, and see that the interests of its members were safeguarded. Mr. A. J. OSTLER, past-president of the Association, in reply, said the progress of the Association had been due to the amicable working of the Joint Boards, the very pleasant atmosphere of which made good work possible.

Mr. S. T. ALLEN, chief engineer, Wolverhampton, proposed "The Joint Boards." He drew attention to the great debt which the industries of this country, and the electrical industry in particular, owed to Mr. Whitley for his scheme, out of which arose the joint boards and joint industrial councils which had preserved in the electrical industry comparative peace since their inception.

Mr. J. H. LEGGE replied for the employers' side of the joint boards, and said that, to his mind, it was quite wrong for the Government to have anything to do with an industry so young. The Government in its proposals appeared to be concentrating on generation alone, but much of the work to be done in this country was to develop the industry. In generation there was no country that could beat us on the figures we obtained, but we were too far behind in selling; more attention should be paid to that side. One difficulty he had in his undertaking was to obtain men with both commercial "kick" and sound engineering ability.

Mr. W. ARTHUR JONES, general secretary of the Association, replied for the employés' side of the joint boards, and referred to the very valuable work accomplished by the No. 5 District Joint Board, in particular with regard to the training-of-engineers scheme. He said the Association had not had a national dispute since the inception of the Whitley Council, and if that lesson was taken to heart it would be much better for industry generally.

Mr. F. J. BALDWIN proposed "The Visitors," to which Mr. A. WHITEHOUSE, J.P., responded, making special reference to the amicable relations between himself and the chief engineers with whom he had come in contact during the formation of the Joint Electricity Authority for the West Midlands area.

Mr. T. A. G. MARGARY referred to the valuable work of the entertainments committee, and specially mentioned Mr. P. M. Pinder, who in reply thanked all members for their co-operation.

An excellent and varied programme of entertainment was interspersed between the different speeches during the evening, the artistes being: Mrs. Thomson, Mrs. Whale, Mr. Brewer and Partner, and Messrs. Friend and E. J. Smith, to whom a vote of thanks was very heartily given.

# The British Industries Fair.—V.

## A Review of Electrical Exhibits.

### Holden & Hunt.

A number of resistance welding machines were shown by this company. The principal one was a spot welder capable of dealing with iron and mild steel up to ¼ in. thickness with one setting and up to 5/16 in. thickness for occasional work. The rating is 12 kW and an automatic trip switch is fitted to guard against excessive loads. Operation, by a foot pedal, is effortless and within the capability of unskilled boys or girls. A hand-operated, 30-kW butt-welding machine was another exhibit. This appliance is water-cooled throughout and has an efficient heat-regulating arrangement. A chain-welding machine (5 kW) capable of dealing with from 10 to 20 links per minute, according to size, was also shown.

### Jackson Electric Stove Co., Ltd.

This company, whose stand was prominent in the view of a part of the electrical display which was reproduced in our issue of February 26th, had a representative exhibit of its cooking and heating appliances. Fires of many designs were on view, including a number of elaborate "period" models and the "No. 589" general utility fire—a plain design with a cheerful appearance. The domestic side of electric cooking was represented by ten cookers to cater for families ranging in number from 2-3 to 10-14 persons. These were all fitted with the special elements which distinguish "Jackson" cookers. Commercial cooking apparatus was also given prominence. One of the appliances in this section was a large fish fryer with a pan measuring 18 in. by 14 in., designed to protect the elements from drippings. The total loading of this appliance is 4,900 W and it has hot-cupboards for storage purposes with a 350-W element. A large roasting oven was shown. This, with a loading of 10 kW, is capable of cooking from 150 to 200 lb. of meat at a time. The oven has a central lagged shelf dividing it into two parts. A collection of hot-plates and hot-cupboards (one of the latter being able to deal with 600 plates) formed a part of the exhibit. There were also a number of wash boilers in various finishes as well as water boilers, irons, kettles, toasters, and other appliances.

### Electric Heating & Hardware, Ltd.

"Glowincoal" fires were the principal feature of this stand. This type of fire has a realistic imitation of glowing coals placed below a curved reflector. The elements are mounted horizontally at the foot of the reflector behind the "coal." A number of designs were shown, all of them of very attractive finish. In addition the company exhibited its "Komet" irons some of which were fitted with an automatically-released switch in the handles, while others had separate earthing terminals with a corresponding plug in the connectors.

### Bastian Meter Co., Ltd.

The well-known "Quartzalite" element was in evidence here. Fires employing this tube of "solid" red heat were shown in various designs. "Bastian" storage geysers were another important exhibit. This appliance has been conceded special rates by a number of electricity supply authorities, several of which have adopted the geyser for their hiring schemes. An electrically-heated towel rail with the low loading of 660 W was another appliance shown, and the company also displayed small heaters, a small steel hardening furnace, an ozone generating machine, the "Pigmy" heater, small grills, and d.c. meters.

### British Electric Transformer Co., Ltd.

This company's stand was one of the largest in the section; it had a frontage of about 70 ft. and was designed to show the firm's ability to supply large quantities of electrical appliances. To this end the back of the stand was almost entirely covered with an orderly array of fires, kettles, irons, toasters, &c. At each end of the stand small rooms were arranged to represent a sitting room, study, &c., and equipped with the company's "Sun Ray" radiators in various forms. These radiators, which have lamps as heating elements, diffuse a soft warm light and impart an air of cheerfulness to a room. Four types of "Tricity" cookers were shown, and the company's transformer business was represented by a number of photographs.

### May & Padmore, Ltd.

This company also showed electric fires of various designs, many of them possessing a highly-artistic appearance. In addition to these, soldering irons, kettles and other devices, were exhibited.

### Veritys, Ltd.

Squirrel-cage and slip-ring motors formed the major part of this company's display, together with spare rotors and examples of windings. Rotor and stator starters, totally enclosed and ironclad with automatic features, and drum-type star-delta starters, were also shown. The "Orbit" fan, which has a wavelike reciprocating movement, was another exhibit, and upon this stand and that of the Birmingham Electric Supply Department, were a number of examples of "Maxlume" industrial lighting fittings.

### Belling & Co.

A number of imitation coal fires with reflector backs, &c., were exhibited by this firm, including one model fitted into a standard grate. "Belling" cookers were shown in operation, and there were numerous examples of other domestic electrical appliances. One of the latter was a 400-W towel rail, the elements of which were contained in a removable cage.

### Mouldensite, Ltd.

This company's exhibit included many samples of its phenolic condensation products, together with raw materials used in the process of manufacture. The samples included synthetic resins, moulding powders and impregnating varnishes, as well as numerous mouldings produced from "Mouldensite" powders, these being particularly suitable for electrical and radio apparatus. The mouldings possess a very high finish, which is maintained under practically all working conditions. The material is not affected by heat, moisture, water, oils, acids or petrol. In its finished form "Mouldensite" is claimed to possess very satisfactory dielectric and mechanical strength.

### Hart Accumulator Co., Ltd.

This exhibit was devoted almost entirely to batteries for radio work. A feature of the l.p. patterns is the fact that they are assembled in pressed glass containers. Upon the insides of these are moulded ribs or grooves between which the plates rest, obviating the need for bottom blocks which tend to collect active material expelled from the plates, sometimes bridging the latter. The separators are of corrugated sheet ebonite. Celluloid-cased accumulators were also shown, as there is a large demand for these. In the "PLRG" h.p. battery, which was shown, the plates are contained in a moulded box provided with internal ribs arranged in such a manner that when a number of the cells are assembled together to form a battery the points of contact are reduced to a minimum, giving perfect insulation. The boxes are made of either ebonite or glass, and they are put up in teak crates. Another h.p. battery shown consists of circular glass boxes, each with a projecting rib which holds it in position on a perforated tray. There were also examples of house-lighting, vehicle, automobile, and central station batteries.

### Henry Watson & Sons, Ltd.

A novel electric lawn mower appeared on this stand. The design of the machine is claimed to be unique inasmuch as the motor is effectively protected by being housed inside the main roller. The cutting cylinder is mounted on ball bearings and is driven by a train of helical gears running in an oil bath. The machine weighs less than 1 cwt. and is very compact. It will be understood that it is not *propelled* electrically but the electrical cutting gear facilitates movement.

### G. Turnock.

This Birmingham firm showed, *inter alia*, an improved cable connector for jointing cables without solder, and also a device for taking a service wire off a main. Another exhibit was a novel method of winding heating coils, making it possible to confine 200 W in a tube 5 in. long by ¾ in. in diameter. This is used for insertion purposes in the textile trades. A charging board for d.c. was shown. This had five circuits, the first of which was in series with the other four which were in parallel, to give various charging currents. Each circuit was provided with a separate 6-in. ammeter.

### S. J. Daulby.

Upon this stand were exhibited a collection of d.c. motors and dynamos. These machines incorporate the Morgan patent, which consists principally of special ventilated pole pieces in conjunction with a fan, which creates an air swirl round the windings and through the pole pieces, keeping the temperature rise very low. The display included some small polishing motors ranging from 0.25 to 2 h.p.

### E. H. Millington & Co., Ltd.

This company showed a wide range of shade and bowl fittings, plain and decorative, wall brackets, globe holders, ceiling roses, &c. A section was devoted to radio apparatus, and in this were "Lintaphone" crystal sets, two-valve sets, and a collection of components.

### Rapid Magnetting Machine Co., Ltd.

This company exhibited examples of its electro-magnetic separators, some of which were of the rotary pattern with a revolving brass drum in which electro magnets are fixed, and over which the material to be treated is passed. Another pattern shown was of the shoot type, consisting primarily of an inclined plane having a series of powerful electro-magnetic bars of alternate polarity extending the width of the shoot, and magnetised throughout their length. This is particularly suited for the treatment of grain, as was demonstrated on the stand.

**Wm. McGeoch & Co., Ltd.**

Marine electrical fittings formed the bulk of this display. These included navigation lamps, switchgear, a special battery switchboard, lighting fittings for ships' use, navigation light indicators, and numerous accessories.

**C. H. Parsons, Ltd.**

In addition to their usual display of lampholders, tumbler switches, &c., Messrs. Parsons this year showed the "Ripplephone" headphones, for which they hold the sole manufacturing and selling rights. The switches shown included a number of shock-proof patterns with unbreakable composition covers. The tumbler switches exhibited were of a wide variety of finishes.

**B.S.A. Radio, Ltd.**

This new concern had a section of the stand of the Birmingham Small Arms Co., Ltd., and exhibited several examples of its radio sets, all of which were of very ornate design.

**W. E. Burnand & Co.**

One section of this exhibit comprised a.c. motors, including one for heavy work, having an extra large shaft, on which, for instance, a heavy band saw pulley could be mounted, and cast steel end frames. Examples of buffing and grinding motors were also shown. Another exhibit was an electric rivet heater capable of dealing with three ⅜-in. diameter rivets up to 3½ in. in length. An electric furnace was also shown.

**Tok Switches, Ltd.**

This was a very comprehensive exhibit of the firm's British-made rotary snap switches; numerous designs were shown, and one application which has met with the approval of engineers of supply companies was the "Aristocrat" interlocking switch plug for surface mounting, consisting of a double pole rotary switch with an external indicator, and a plug of the B.E.S.A. end-shield pattern fitted with an earthing terminal, capable of taking a wide range of cables.

**London Electric Wire Co. & Smiths, Ltd.**

A very comprehensive display of its wires and cables was made by this concern. Special prominence was given to "Glazite," the wire covered with many colours, for use in radio sets. Another radio product shown was the "Lewcos" inductance coil which is claimed to have a low h.f. resistance.

**B.K.B. Electric Motors, Ltd.**

A number of strongly-constructed fractional h.p. motors were shown by this firm, including an induction motor with a centrifugal switch device. An application of these motors in the form of the "Giljay" d.c. battery charger, the machine being fitted with a double-wound laminated armature and two commutators. A small switchboard with an ammeter is mounted on the frame of the machine and the whole forms a very compact and easily-operated equipment.

**Magnetic Separators, Ltd.**

This company's principal exhibit was a "Cascader" separator for extracting iron from granular or powdered materials and liquids. The machine is constructed in a series of steps, each step being undercut and having beneath it a magnetic field. As a result the lines of force from the pole shoes pass from a higher to a lower level across the undercut edge, developing a very strong magnetic field throughout the entire width of the magnet. Consequently as the flowing material falls over the pole shoes from a higher to a lower level any particles of iron, which would otherwise be carried along, are drawn into the angular spaces out of the path of the flow and retained there. Magnetic pulleys were another exhibit of the company.

**Bulpitt & Sons, Ltd.**

Among a collection of aluminium ware, this company showed a range of electric kettles, fitted with a loop-type immersion element and a patent safety device. The latter consists of a spring compressed into a small copper tube and retained in position by a plunger soldered with a special alloy into the open end. When the kettle is overheated the alloy melts and releases the spring, throwing off the connector.

**Arora Co.**

Several examples of its electric fires were shown by this firm. These were fitted with the firm's standard firebars which employ extra heavy tape-section strip for the coils, giving radiant heat at low current density. Cast-iron and sheet-metal frames were exhibited, and the types included the standard upright, bowl, reflector and other patterns.

**Imperial Engineering Co.**

This firm's exhibit was composed of a number of domestic appliances, including fires, irons, toasters, kettles, boiling rings, water heaters, &c. The "Imperial" iron, which was shown, has a number of special features. The fires included a number of sheet-metal and cast-iron patterns, some of which took the form of reflecting bowls mounted in ornamental frames. Several reflector types, as well as standard upright patterns, were also shown. A wash boiler with a loading of 3 kW and a capacity of 2½ gallons, was exhibited, and another useful appliance shown was an electric bath water heater with a continuous loading of 200 W and a booster loading of 3½ kW. The tank has a capacity of 10 gallons.

**Bowen Instrument Co.**

This company's principal exhibit was a number of electrical resistance pyrometers for measuring temperatures at a distance, together with accessories for these. The firm's "Polymeter" combines the indicator, multiple switch, and front cable terminals in one complete unit.

**Tangyes, Ltd.**

Engines and pumps constituted this company's exhibit. The former included a 47-b.h.p. cold-starting horizontal, heavy-oil engine, which is claimed to be very suitable for the driving of an electrical generator. There was also an 18-b.h.p. heavy-oil engine of the lamp-starting type. The pumps included a six-stage turbine pump, a 4-in. "A" type "Tangyro" centrifugal pump, and vertical single-ram patterns.

**Steam Fittings Co., Ltd.**

The scope of this company's exhibit is indicated by its title. A notable feature of the display was a range of automatic regulators, including all-metal relay thermostats suitable for controlling steam valves and maintaining temperatures up to 1,000 deg. F. This type is said to be so sensitive that when adjusted for room temperature it will operate a main steam valve when merely warmed by the hand for a few seconds. Boiler feed regulators, dial-indicating draught gauges, and dial thermometers fitted with contacts for operating electrical relays, were also included.

**Reeves & Co.**

This stand bore a large display of electrical accessories, including lamp-holders, tumbler switches, switch plates, galleries, &c.

**Higgs Motors.**

This display comprised component parts of a.c. and d.c. motors, assemblies of component parts, motor-generator sets, complete d.c. dynamos and motors, and one-, two-, and three-phase squirrel-cage and slip-ring induction motors. A notable exhibit was one of the firm's motors running under water.

**Birkbys.**

Upon this firm's stand were displayed numerous samples of "Elo" synthetic resin products. A particular feature was made of mouldings for radio and electrical work. Other compositions shown were insulating varnishes, synthetic resin in "lump" form, and moulding powders.

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# The London Fair.

**Cousins & Co.**

On this stand was shown the "Cousins' Perfect Electrical Waver" for Marcel-waving at home. This is an ingenious and convenient appliance, which is heated by electricity from the mains, but is disconnected before application to the hair. It was demonstrated in use.

**The McClary Manufacturing Co.**

This Canadian company showed electric cookers of several patterns, including the convenient bench type. An important change has recently been made by the adoption of a closed boiling plate, called the "Speediron," which is immune from injury by spilt fluids, &c. The plate is provided with prong terminals which fit into protected contacts underneath, so that, if necessary, it can be pulled out in a moment, without leaving any live metal exposed. Similarly the oven and grill elements are self-connecting. We understand that the "Speediron" is being fitted to all the McClary electric ranges. Other notable features were the use of a simple thermometer on the oven, showing four grades of temperature in bold figures, and an enamelled hob which cannot rust or peel.

**Needham Bros.**

The well-known portable electric fountain patented by this firm was shown in operation.

**British Thomson-Houston Co., Ltd.**

This double stand was furnished with the standard crystal and valve receivers, amplifiers, loud speakers, headphones, and valves with which the wireless world is familiar.

**Clackson, Ltd.**

Several new items appeared on this stand, such as the "Lowforma" coils and "Lowforma" crystal set; the latter was a very neat and compact arrangement, with provision for receiving Daventry, as well as the other stations. Other features were the "Triumph" two-coil holder, and the 5-in-1 coil mount, with which a variety of purposes can be met. Ebonite components are amongst the company's products.

**Burndept Wireless, Ltd.**

The leading feature of this exhibit was a seven-valve superheterodyne set, with frame aerial. The company has entered the valve-manufacturing business, and showed a complete range of valves—one bright, and eight dull-emitters—of its own make. "Ethophone" specialities, the "Peter Pan" loud speaker, and everything required by the wireless experimenter, were shown.

### Telegraph Condenser Co., Ltd.

This exhibit included condensers not only for radio work but also for power factor correction, the latter being manufactured on the large scale for voltages up to 6,000 V, in the form of one-microfarad units which are built up in frames, and immersed in oil-filled steel tanks. Box-type condensers for individual motors, suitable for any voltage between 200 and 600 V, are made. The range of Mansbridge-type condensers has been extended to 10 mF. For radio, both the Mansbridge standard condensers and mica moulded condensers were shown, both having duplex terminals, which provide facilities for screwed or soldered connection at will; the former are made with a solid metal top. The series-parallel mica condenser was a new feature, made in sizes from 0.0001 to 0.0009 mF.; it enables the grid leak to be put in series or parallel with the condenser without changing the wiring of a circuit. Another interesting item was the "silent salesman"—a cabinet made up to resemble a T.C.C. Mansbridge condenser, and holding a supply of 50 assorted sizes.

### Receiving Sets.

MESSRS. WATES BROS., LTD., showed receiving sets, batteries, and loud speakers; BRITISH RADIO CORPORATION, LTD., cabinet receiving sets and components; ELVEN MAINS RECEIVER CO., sets operated from the mains, a.c. or d.c., without batteries; HALCYON WIRELESS SUPPLY CO., LTD., portable sets without aerials or earth connections; READ & MORRIS, LTD., receivers worked from a.c. or d.c. mains, and other types; ASHLEY WIRELESS TELEPHONE CO. (1925), LTD., "Claritone" loud speakers and headphones.

### Permec, Ltd.

An ingenious micrometric crystal detector—the 1926 Permec type—was shown here, which enabled 200 different spots on a crystal to be touched by the cat's whisker, safeguarded the parts from frictional or other damage, and enabled any particular adjustment to be returned to with precision. Complete crystal sets were also shown.

### The Formo Company.

Amongst the exhibits at this stand, items of special interest were a condenser described as the "straight-line frequency ultra low-loss" type, with special patented features, including a "micro-vernier" 200-to-1 dial, and a series of high-efficiency coils for tuning and coupling systems, with bank-wound turns on skeleton formers, of very ingenious design. Shrouded transformers and choke capacity couplers, plugs and jacks, &c., were also shown.

### Radio Accessories, Components, &c.

A number of stands were devoted mainly to displays of wireless components and accessories; amongst these were the following firms:—WESTERN LABORATORIES, LTD., coil-holders, condensers, and crystal sets; WATMEL WIRELESS CO., LTD., grid-leaks, condensers, chokes; J. J. EASTICK & SONS, collapsible frame aerials, coil mounts, variometers; BEARD & FITCH, LTD., gear wheels, "Success" transformers, and other accessories; FINSTON MANUFACTURING CO., LTD., coils, condensers, mouldings; LISENIN WIRELESS COMPANY, plugs and sockets, terminals and other components; NORTH LONDON VALVE CO., LTD., valves, X-ray tubes, and experimental apparatus.

# Electro-Farming.

## The Applications of Electricity to Agriculture.

By R. BORLASE MATTHEWS, M.I.E.E.

(*Abstract of Paper read before the* INSTITUTION OF ELECTRICAL ENGINEERS.)

THE paper deals with the progress that has been made since the author's previous one on the same subject,* being also a sequel to the report of the I.E.E. Committee on Electricity in Agriculture.†

It is strange that one of the most backward countries in this development is the United States of America. Out of 15,788 million h.p.-hours per annum used on American farms, only 850 millions are supplied electrically. However, the matter is being taken up most energetically, and large sums of money are being expended upon full-scale experimental work.

*The Rural Distribution System.*—Attention is drawn to the importance of dealing with satistics on the basis of route miles, and not the area supplied. It is claimed that where a quarter of the area is arable land, the supply will be profitable. Even in the towns the facts are much better represented by considering cable route-miles instead of square miles of supply area; in the country there are already routes whereon the consumption per mile of 10,000-volt distributor without ploughing is equal, or more than equal, to the urban figure, and the possible revenue per route mile of rural line is, at least, as large as that from the usual town load known to be profitably supplied. It must be remembered that villages and rural industries will take a considerable supply in addition to that consumed by the farms. Anything over 5,000 units per annum per mile is profitable; the important matter is to exercise economy in construction work.

Practical experience indicates, at the present stage, that in order to provide a remunerative electricity supply, from a quarter to a third of the area must be arable or rich dairy land. The point is not so much whether electric ploughing is to be employed or not—it will probably not be used in many districts for a few years—as the fact that a farmer with a good proportion of arable land needs to treat, in some way, the crops which he produces, or else he has to prepare food for stock. The amount of power necessary for these purposes has a direct relation to the area of land under the plough, and also to the fertility of the soil. In some of the more fertile parts of Europe the consumption of electricity is already 100 units per acre, without taking into account any current actually employed on the land for ploughing or other purposes. Ploughing and cultivation would have consumed an additional 60 units per acre, while treatment and the handling of crops would absorb up to 40 units per acre. Over and above all this, there is a very important load that has not yet been touched, *viz.*, that of haulage, estimated at about 75 units per acre. Thus, under ideal conditions, it is possible to conceive a consumption of 275 units per acre, based upon present practice. In this country alone, assuming that its 57 million acres of land were all suitable for agriculture, on the above basis of consumption the requirements would be about 16 000 million units per annum, whereas the present output of all the generating stations in the country, including the output for railway work, is only 7,415 millions.

The e.h.p. lay-out of the line only differs from the usual practice in that additional tappings have to be provided

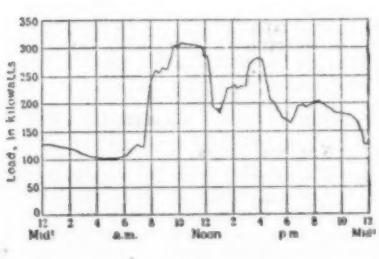
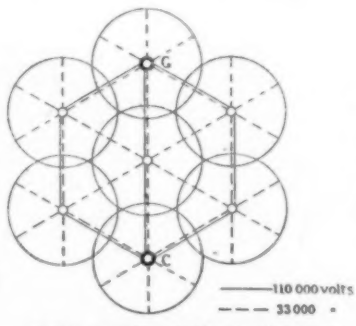



Fig. 1.—Load Curve of English Rural Distribution Line.




G C = generating stations 50 miles apart.
Sides of triangles represent distances of 25 miles.

Fig. 2.—Example of E.H.P. Rural Distribution.

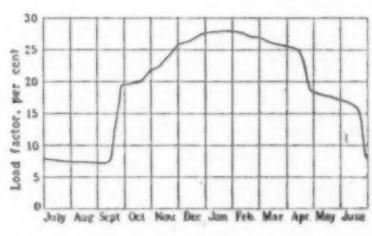



Fig. 3.—Load Factor of Mixed Dairy Farm.

* ELEC. REV., April 7th, 1922, *et seq.*
† *Ibid*, September 4th, 1925.

*en route*. It will often be found advisable to utilise two (or even three) distinct routes at some considerable distance apart. One route might be the most direct between the towns; the second (and third, if required) should go through the centres of gravity of the anticipated rural demand.

The distribution system in the initial days of rural supply, in order to reduce line construction costs, will undoubtedly be worked with a greater voltage-drop during the day-time than would be permissible for city work. Fig. 1 is a typical load curve for an English rural distribution line.

On the Continent l.p. supply seems to be settling down to 380 volts, three-phase, 50 cycles, for power, with 220 volts between one-phase and neutral for lighting; in Great Britain favour is given to 400 volts, three-phase, 50 cycles, with 230 volts for lighting. The possibilities of single-phase rural distribution and the use of galvanised steel conductors are receiving very considerable attention.

To maintain the above-mentioned voltages, the countryside has to be set out in circular adjoining areas of approximately three miles diameter, each supplied from a 10,000-volt sub-distribution system, connected to the main e.h.p. distribution of 30 to 220 kV. At present a 25- to 50-kVA transformer is usually sufficient for each of these sub-stations. In most countries there is an average of 1¼ farms and 2 other consumers per mile of l.p. distributor. Each 10,000-volt transformer station will supply about 22 farms and 30 to 40 other consumers, including motors totalling up to 200 h.p. Though the load factor per motor is low, that per farm (the more important matter) is high, based on its maximum demand. It averages at present 35 per cent., giving a consumption of 90,000 units per annum, *i.e.*, 43,000 units per route mile of 10,000-volt distributor. As an example of e.h.p. distribution, assume two super-power stations, G and C, situated 50 miles apart, fig. 2, and connected by a 110,000-volt line. If the district was arable there would be an area of supply of about 2,000 sq. miles. On the basis of estimates made for city conditions, it would seem almost hopeless to think of attempting to supply such an area. However, if the work is carried out on the lines suggested in this paper, basing the distribution on the route length, it will be found that an annual consumption of 96 million kWh can be supplied by increasing the

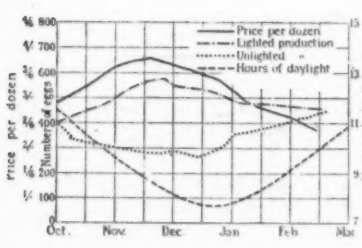



Fig. 4.—Gain in Egg Production due to Electric Lighting.

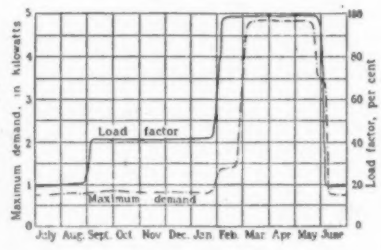

Load factor
Maximum demand
Maximum demand, in kilowatts
Load factor, per cent
July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June

Fig. 5.—Load Factor of Poultry Farm.

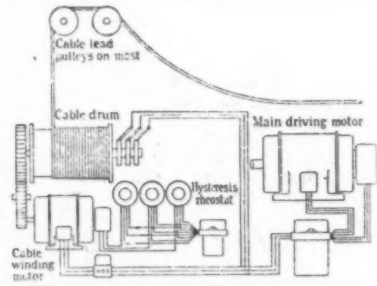



Fig. 6.—Hysteresis Control for Tractor-winding Motor.

length of e.h.p. line to 200 miles. In addition, there would have to be provided five open-air sub-stations, 375 miles of 33,000-volt sub-transmission lines, and 500 miles of 10,000-volt feeders to the local l.p. sub-stations would also be needed. For the scheme set out in fig. 2, one e.h.p. line would go by the shortest route between the cities and two others would also be provided, one parallel on one side at an average distance of, say, 15 miles, and the other a similar distance away on the other side. Thus the five 110,000/33,000-volt sub-stations may be situated at the centres of gravity of the local demands.

It is assumed that the l.p. distribution network (380/220 or 400/230 volts) will be supplied by the local communities; hence, the power supply undertaking would have to consider only the cost up to and including the 10,000-volt sub-stations. Such a lay-out only requires one mile of 110,000-volt line per 30 sq. miles (19,200 acres) of land, plus a mile of 33,000-volt line per 8 sq. miles (5,120 acres) of country, plus a mile of 10,000-volt line per 6 sq. miles (3,840 acres) of ground. Ample provision of 33,000-volt lines is suggested, with a view to the supply of the ploughing and threshing loads.

Amongst the details that reduce the cost of overhead lines the matter that requires careful watching is so to design the line that most of the construction work on the poles, insulators, &c., can be done in the factory, not on the road-side where labour is so much more costly. The high cost of tapping e.h.p. lines at intermediate points is perhaps the greatest difficulty. Undoubtedly the best plan is to provide a sub-transmission line at, say, 33,000 volts, connected at both ends to the e.h.p. lines, giving in effect a ring main. From this 10,000-volt feeders can supply the 50-kVA sub-stations at 3-mile intervals along the rural routes. Very often it is advisable to employ intermediate distribution lines at 1,500 or 3,000 volts. Heavy loads which move from farm to farm or field to field as the work is finished are probably better connected to the 33,000- or 10,000-volt lines than to the low-pressure distribution system; the switches, protective gear, meters, &c., would be contained in portable transformer wagons.

In several parts of the Continent it is permissible to connect these temporary loads by hooks on to 33,000-volt lines. Excellent foolproof temporary connections are now available for 1,500 to 3,000 volts and also 10,000 volts, which can easily be used by the more intelligent farm hands. Their use means a considerable saving in transformer iron-losses, the transformers being cut out of circuit when not required.

*The Farm Installation and its Uses.*—Whilst the use of electricity is still a novelty in this country, nearly a million farmers in other countries are employing it; over 500 British farmers are utilising it, and the number is fast increasing. Over 200 uses for electricity have already been found on farms; the author has 67 on his own 600-acre farm at East Grinstead. Farm electrification means much more than belting a standard industrial motor to the existing agricultural machines.

The best insulated conductor for farm purposes, in the experience of the author, is "Maconite." This well withstands stable fumes and high temperatures such as that of a dairy steam boiler. When used in the open air, however, exposure to the sunshine seems to dissolve out some of the gums in the composition.

To avoid accidents the type of hand lamp to be used should be specified, and outlets for electric motors should be of an interlocked type, so that a plug cannot be removed or inserted unless the socket is dead. In Europe there is now an agricultural electric motor quite distinct from the industrial type. Since the war such a large proportion of the output (75 to 90 per cent.) of electrical manufacturers' motor-shops has been of the agricultural type, that such motors are now often supplied for industrial work, to the advantage of the factory using them.

The requirements are those of a mining motor, at the cost of an industrial one. As lubrication is erratic, ball bearings should be used. A simple built-in overload circuit-breaker should be provided, and any starter should also be enclosed in the frame. The windings should be vacuum-impregnated so as to be moisture-proof. To keep down first cost, an internal ventilation system is essential. To avoid special fixed wiring, a plug connection should be used for the cables. The motor must be capable of working in an inverted or vertical position. The outside should be smooth and easily cleaned. Most farm motors can be started light, so that they can be of the squirrel-cage type; it is quite common to fit centrifugal clutches or sliding rotors to make starting still easier. Particularly in the larger sizes, wound-rotor motors with automatic short-circuiting and brush-lifting devices are useful, as they combine the advantages of both types.

A 5-h.p. motor is the largest needed on most farms, except for ploughing, provided the supply engineer is in a position to recommend suitable farm machinery. If the farmer cannot be persuaded to use small farm machines which can be operated by a 5-h.p. motor, he usually goes to the other extreme and uses very large ones, such as a threshing machine combined with a straw presser, requiring a 25- to 40-h.p. motor. When such a motor is used on a much smaller load its power factor is very poor. To improve this, it may be fitted with a star-delta switch for the stator, the star position being marked, say, "light load" and the delta position "heavy load."

There are now a number of agricultural-type motors on the market which, by the use of self-contained compound-reduction gearing, can be coupled direct to the machine to be driven. This saves much time by avoiding belts, which, in the hands of farm labourers unused to them, give endless trouble. For motors of 5 h.p. and under, friction drives can be used instead of gear wheels.

Homestead equipment should be of the most robust and practical character. On some parts of the Continent to-day it is rare to find a farm without its electric washer, but it has cost one-fourth the price of the admittedly better type of washer available in this country. Electric cookers have not yet reached the simplicity of the better-class gas cooker, though hire and hire-purchase schemes have helped. Water heaters are required in the kitchen and in the dairy; it is advantageous to couple them with an auxiliary fuel-fired heater, and a small direct-coupled electric blower would assist in lighting a fire.

It is wise to submit to the farmer suggestions that enable him to improve his load factor and thus purchase electricity on the most favourable terms, *e.g.*, multi-way switching, whereby, when the current is in use on one important piece of apparatus, other current-consuming devices cannot be

switched on. When other appliances are not in use the current can be switched on to the water boiler; when the larger appliances are in use in the house, the motors in the farm buildings should be switched off. There is no practical objection to doing this, especially on the smaller farms, as it only requires a little rearrangement of the farm work.

At least half-an-hour per day per man can be saved in the feeding of live stock by the aid of a good light. Poultry-house lighting is now a recognised commercial practice, for the very good reason that there is an increase of 15 to 43 per cent. in the egg production during the winter months, when prices are highest, fig. 4. Contrary to the popular idea, the birds are not in any way strained as they get 10 hours' sleep each night. They are simply allowed ample time for feeding, instead of being partially starved owing to the long winter nights in this country. Fig. 5 shows typical curves of poultry-farm maximum demand and load factor.

The author has recently obtained new results of commercial importance to the market gardener in connection with the transplanting of seedlings, and one-night treatment of greenhouse plants to obtain more rapid progress.*

A novel application, which is still in the experimental stage at East Grinstead, is the electric lighting and heating of bees in the early spring. The hives are all placed inside a house, instead of being kept in the open air in accordance with the usual practice in England. The basis of the idea is that, by this treatment, strong hives are obtainable at the time when the orchards are in bloom, thus about an additional 17 lb. of honey can be obtained per hive per annum.

Earth currents, one of the earliest applications of electricity to agriculture, has lately been revived in a novel manner by M. Christofleau, in France. Confirmatory tests are at present being conducted in the author's garden. Further experimental work is, however, necessary to confirm the results obtained so far.

*Work on the Land and Haulage.*—So large a proportion of the power on a farm is used on the land that all parties should consider very seriously the best methods of cultivation by electrical means. If electric ploughing is carried out on a large scale, the power required is so great that for an economical distribution system the voltage must be fairly high. This is a point overlooked in most discussions on rural electrification; one very successful equipment uses 5,000-volt motors. Most of the successful plants are of large size, capable of ploughing up to 27 acres a day (a horse can plough barely an acre a day). The capital cost is high, and such an equipment is only suitable for contractors or co-operative societies. In practice an electric plough can be kept fully occupied for at least 200 days in the year, and this is quite a reasonable period over which to spread interest and depreciation.

Small electric ploughs are still in an experimental stage; the author has formed a clear idea of the most suitable type for the individual farmer. It must be controllable by one man and should be of the tractor type to obviate anchorages. Two electric motors should be fitted, one of about 25 h.p. for the main drive, and the other of about 2 h.p. for winding in the cable when it becomes slack.

Fig. 6 illustrates a very ingenious system of hysteresis control for a cable-winding motor, which is successfully employed on the Continent. The cable-winding drum is operated by the motor through a friction drive. When the tractor is driven away from the source of supply, the cable is drawn out against the friction drive, and when the tractor returns the cable is slackened. As the resistance to the motor drive is thus removed, the motor comes into operation and winds up the cable until it reaches a predetermined tautness. Owing to the hysteresis control, the operation of the motor is automatic; further, it will not burn out when the tractor stops or the cable drum reverses.

Major A. MacDowell has recently developed in Scotland an original form of single creeper tractor for ploughing, with which is incorporated a novel method of side-stepping the whole machine ready for the next furrow and also a new way of handling the flexible cable.

One of the practical difficulties experienced in connection with electric ploughs is that of transport from field to field, and also the fact that they cannot be used for general haulage work on public roads. The author's proposal is to equip a creeper-tractor with batteries and thus employ it as a vehicle for haulage on public roads, and also for haulage of timber and crops when it is not convenient to connect to an overhead line. Ploughing is the principal load on the farm. A tractor can also accomplish much other work, such as cultivating, harrowing, rolling, seed drilling, harvesting, &c., and nearly all the existing farm implements except harvesting machinery can be used.

Quite a new development is to reduce the resistance of the soil to the ploughshare by passing a current of electricity between the coulter† and the ploughshare. An actual lubrication effect is secured by making use of a special property of soils to produce, by electrical means, a film of water between the furrow slice and the mould-board of the plough. The water in the soil seems to move from the positive electrode towards the negative. This property has, in fact, been used as a preliminary method of removing water from peat, preparatory to drying in the usual way. The idea is due to the work of Messrs. E. M. Crowther and W. B. Haines, of the Rothamsted Experimental Station, who have carried out a good deal of laboratory work in this connection, and eventually a full-scale series of tests at Greater Felcourt Farm, East Grinstead. Laboratory tests have shown that the friction under favourable conditions can be reduced by as much as one-third. These results have also been corroborated by Captain B. J. Owen in connection with mole draining.

It is impossible to say whether or not ploughing is actually an essential operation in farming, and there are now a number of machines in existence which attack the problem in quite another way. Just as the milling machine has superseded the planing and shaping machines in the engineering workshop, so it seems likely that the rotary tiller will have very many advantages. Certainly the action of ploughing seems very unmechanical in that really the ground is wedged over, which has a tendency to produce the very pan to which so many farmers object; also the rotary tiller lends itself conveniently to an electric drive. The earlier designs of these machines produced a fine tilth, which was apt to set down solidly after the first shower of rain; however, improvements in the construction of the tines, or teeth, enable both weeds and manure to be buried and the soil left in the form of clods.

Then there are many ways in which, by the aid of electricity, the farmer can circumvent the clerk of the weather and expedite work generally, and a few years ago a commencement was made in the manuring of Swiss fruit farms by means of stand pipes in the orchards, supplied by underground pipes and electric pumps from a tank adjoining the main buildings. The author's opinion at that time was that although this method might suit orchard or market-garden practice, the installation would be too expensive for ordinary farm work. The process, however, saves so much labour, both of horses and of men, that it is being adopted in general farm practice. The mains thus used for manuring the fields with liquid manure can, of course, also be employed for watering them in exceptional seasons of drought. The consumption of electric current for liquid-manuring and watering in accordance with this process amounts to 90 units per acre.

To obtain the utmost advantages from electricity the farmer will have to be asked to do many things in new ways. It is of vital importance to the whole nation that agriculture should be placed on a sound basis, and on this account alone the question is well worthy of the most serious investigation by the electrical engineering world.

* See ELEC. REV., October 30th, 1925.

† The coulter is either a disk wheel or a cutting wedge which opens up or cuts the surface of the soil to facilitate the work of a ploughshare in turning over a furrow.

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**Rural Electrification in France.**—An investigation concerning the utilisation of electrical energy in rural districts and its possible development has been made on behalf of the Ministry of Agriculture by M. Proust, engineer, of Grenoble, in the case of the Isère department. This region comprises 564 communes, of which 280 were provided with a supply of electricity in 1920, while constructional works are now proceeding in a further 200 communes. The annual consumption for lighting purposes varies between 15 and 17 kWh per inhabitant. Certain hamlets which are outside the area of general distribution propose to bear the cost of the erection of supply lines. The use of electric motors for various operations on the farms is increasing for cutting straw, pumping, sawing, elevating, and for the driving of thrashing machinery, the size of the motors being usually from 2 to 3 h.p. The number of hours of use per annum is very small, averaging about 100. As a result of the growing extension of electricity supply a development is taking place in silk weaving, where besides weaving mills having from 20 to 30 looms, domestic weaving is carried on with from two to ten looms, although mostly with six. The development of domestic weaving is said to be encouraged by the employers; the motors used for these purposes are from 0.33 to 0.5 h.p. for individual drive and of larger powers for groups of looms, although the individual drive is said to be usual. The annual use of these motors represents about 2,000 hours or 20 times that of motors employed for agricultural requirements. The extension of domestic weaving tends to keep the female population from migrating to the towns. It is further stated by M. Proust that the development of electricity supply has been the means of the establishment of a new industry in the form of the manufacture of electrical apparatus, for the production of which small factories of about 12 workmen each have been opened at Pont-en Royans, Choranche, Rencurel and Chapelle-en-Vercors.

**Steel Production Direct from the Ore.**—A large steel furnace is being completed at the Swedish works of the Uddeholm Company, with the assistance of the Swedish Ironmasters' Association, for the production of electric steel from iron ore, according to a method devised by Mr. Flodin, and it is expected that the furnace will be set in operation in March. This engineer read a paper on his process at the meeting of the Iron and Steel Institute in London last September, when it was suggested during the discussion that the method was only suitable for the production of the highest qualities of steel, and that the high charges for electric power in Great Britain would render it impossible to use the process in this country. The actual capacity of the new furnace has not yet been disclosed, the directors of the company preferring to await the working results before giving any information on the subject.

# New Electrical Devices, Fittings and Plant.

(Readers are invited to submit particulars of new or improved devices and apparatus.)

### Improved Circuit Breakers.

The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2, has recently introduced a new range of R.A.T. circuit breakers, specially designed for the efficient protection of lighting and power circuits of up to 100-A loading at up to 660 V. They embody the usual automatic overload and no-volt releases and are made in the open type (fig. 1), mounted on enamelled slate bases, or in the factory type (fig. 2), enclosed in asbestos-lined cast-iron cases with inspection windows and external operating handles in either single-, double-, or triple-pole patterns.

The no-volt coil is claimed to operate when the pressure is reduced to 65 per cent. or less of its rated value, or with the rated frequency maintained it will release when the pressure drops to 75 per cent. It is self-resetting with the pressure value at 90 per cent.

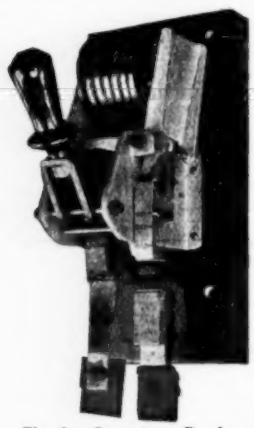

Fig. 1.—Open type Breaker.

Fig. 2.—Factory Type.

These breakers can be set to operate on currents up to 100 per cent. above normal, the scale being marked at three points which represent normal, and 50 per cent. and 100 per cent. above normal. A loose-handle provision prevents the breaker being held closed against abnormal conditions, and an anti-hesitation device ensures that the handle must be carried through the whole travel into the full-on position, when closing the circuit breaker, otherwise the latter will immediately open if there is any hesitation in closing.

### A Novel Electric Water Heater.

The accompanying illustrations, figs. 3 and 4, show an electrically heated boiler which has been recently marketed by Messrs. Jackson Boilers, Ltd., 83, Kirkstall Road, Leeds. It is designed for self-feeding, direct from the main water supply, and to give an immediate supply of boiling water in quantities sufficient for the reasonable requirements of the catering trades. The supply water is controlled by a standard ball-tap valve, and by an ingenious combination of boiling-water-storage and pre-heating arrangements, boiling water in reasonably large quantities, it is claimed, is always available. Fig. 4 shows sectionally the arrangements of the boiler. The water is fed from the ball-tap cistern A, *via* the trap B, the shell C, and the feed pipe H to the boiling chamber D, in which are located the blades J of the immersion heater.

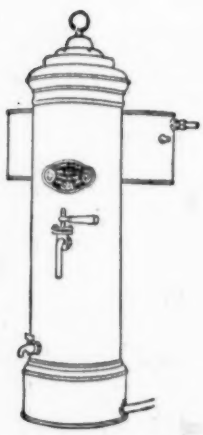

Fig. 3.—Jackson Boiler.

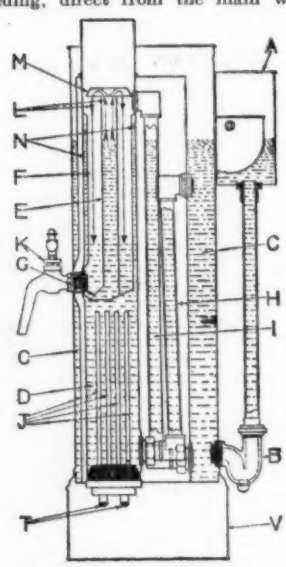


Fig. 4.—Sectional Arrangements.

When it is raised to boiling point the water ascends the expansion pipe E and is deflected by M into the collecting chamber F. Boiling temperature is maintained here by the jacket N, an extension of the boiling chamber. The bottom of the collecting chamber and top of the boiling chamber, G, is specially shaped to deflect steam to the jacket N and to the expansion pipe.

If the water is not drawn off as it boils it fills the collecting chamber and overflows through the pipe I to the bottom of the outer shell C, thus heating the contents of the outer shell so that a bulk of hot feed water for supplying the boiling chamber is available when required. The supply leads are taken to the immerser terminals T through a hole in the base V.

It is claimed that very large quantities of boiling water can be maintained simply by increasing the capacity of the outer shell. With a loading of 4½ kW boiling water is said to be obtainable in four minutes after switching on, and afterwards at the rate of 72 pints per hour when the whole contents of the boiler are fully heated.

### A New Electric Lighting Fitting.

A new range of electric lighting fittings, cylinder units, has been introduced by Messrs. Smith & Ansell, Ltd., Stockfield Road, Acocks Green, Birmingham. This fitting is designed to embody the advantages and eliminate the disadvantages of the bowl and enclosed types of fittings. Fig. 5 shows one pattern of the range, SA-3,202; it is suitable for a 40- to 100-W gasfilled lamp. The cylinder is 6 in. in diameter, and that of the white vitreous-enamel finished reflector is 15 in. The feature is a glass cylinder which surrounds the lamp vertically, and is supported by means of an external flange at its top. The cylinder is of special diffusing glass for about two-thirds from the bottom, the upper portion being clear. Various forms of reflectors and suspension gear are used in other models, and the principle of cylinder lighting can be employed in decorative forms if desired. The advantages claimed for this type of fitting are that dirt collection is largely obviated, glare is avoided, a minimum of light is lost through absorption, immediate access to the lamp is provided, and there are no loose parts. A neat and convenient means of suspension is offered by means of a ceiling plate fixed direct to the conduit box, &c., affording an easy inspection of connections and rapid erection. A central wireway suspending chain is provided.

### An Emergency Igniter.

An interesting and simple device, the auto-igniter, designed to serve the motorist as a stand-by means of ignition in the event of a complete break-down of the usual electrical ignition, has been marketed by Messrs. F. A. Wilkinson & Partners, Ltd., Gretton, near Kettering, Northamptonshire. It consists of a number of units, fig. 6 (corresponding to the number of cylinders) one of which is screwed into each cylinder in the place of the sparking plug or into a tee piece between the plug and the cylinder, so that the two devices can be used in conjunction. Each unit or cup is fitted with a special type of electric heating element contained in a screw-in cap fitted with the necessary terminals. The element is connected through a switch to the car or other battery, which can be switched off when the sparking plug commences to function. The device should be particularly valuable for motorists when touring, and for isolated generating plants in the country or Colonies.

Fig. 5.—Cylinder Unit.

Fig. 6.—Emergency Igniter.

# Correspondence.

***Correspondents should forward their communications* at the earliest possible moment.** *No letter can be published unless we have the writer's name and address in our possession.*

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**"Electrical Freedom."**

As a contractor who has been in business for over 25 years, I am just as amused at Mr. L. L. Robinson's article as he appears to be at the pamphlet issued by the Electrical Contractors' Association.

Most contractors would be very pleased to accept work at 20 per cent. on cost. What does Mr. Robinson mean by this? Does this 20 per cent. cover establishment charges as well as profit, or is he offering 20 per cent. profit after establishment charges have been added?

What is the cost? Who knows it until the job is finished? We all do our best to estimate the cost, which is a very different thing.

The trouble is that the supply authorities think wiring is an easy job and estimating easier, whereas the experience of most contractors is that estimating to be correct can only be done after years of experience.

I may quote an example in my town, where they have recently opened an electrical showroom and are hiring out cookers; the city engineer has been offering cooker wiring to contractors at a price at which the work required cannot be done, and when an interview was sought with the city engineer he admitted that the price he fixed for the work was not quoted out of any data at all. It was merely a figure which they thought would be satisfactory, and in any event the offer to do a certain amount of free wiring was more or less "a sprat to catch a mackerel." Is this fair trading? The showrooms now being fitted up by municipalities cannot in themselves be run as commercial concerns. If contractors could force municipalities to keep their costs for running the showroom, including establishment charges, proper apportionment for rent, supervision, &c., and salaries of staff, we would soon show who could do the work cheaper. Mr. Robinson cannot run a showroom and carry out wiring cheaper than a well-organised electrical contractor who has reasonable establishment charges.

As regards Mr. Robinson's statement that contractors put wires in so small to lighting points that irons, kettles, cleaners, and radiators cannot be used, we have yet to learn that an iron or kettle or a cleaner cannot be used on 1/.18 or 3/.029 wires.

In conclusion, the article obviously shows considerable bias.

**Fair Does.**

*March 2nd*, 1926.

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The article which appears in your current issue under the title of "Electrical Freedom," by L. L. Robinson, M.Inst.C.E., will probably be commented upon and should not pass unnoticed. One is inclined to ask: "When is it possible for Mr. Robinson to speak well of the electrical contractor?" At all events, it is high time that this engineer should encourage the efforts made by the E.C.A. and others to raise the standard of contracting work. The attitude taken is more likely to arouse a controversial spirit antagonistic to the end which he himself has in view. Granted that the pamphlet referred to has a streak of humour—the levity shown in his own article does not help to create the correct understanding of the difficulty.

We will allow that this supply engineer is making a satisfactory advance with the sale of "juice"—but we will not admit that he is equally successful in selling electrical goods. Are the goods sold price-maintained? Are the goods bought at factors' prices or ordinary trade terms? What is the equity of the sale in comparison with a ratepayer offering the same article? Mr. Robinson may claim that he sells the article and so increases the call for current—but will he also answer to the claim that he has closed his eyes to the usual trade observance as between manufacturer and retailer—or, in plain English, does he cut out the middleman? The local conditions may or may not be desirable; that hardly concerns the public. We simply point out that any difficulties at Hackney do not call for a wholesale condemnation of the electrical contractor.

It is well to remember that there is a large number of electrical contractors throughout the country, firms of standing who have large staffs with attendant heavy wages accounts—these are established firms of integrity and resource who would scorn the impeachment of undersized cable and other mean and underhand practices. These firms would find more prosperity and sound business if the station engineers would confine themselves to electricity supply, reducing their steam-raising costs, works costs, and supply services, in order that electric current should be popularised.

The supply engineer invariably gives encouragement to the blatant and showy advertiser whatever the merits of the article he desires to sell—vacuum cleaners, kettles, and other consuming devices. Why blame the contractor for neglecting this source of income? The contracting firm has a host of competitors—the large stores, the furniture dealers, and others, as well as the "hucksters" and "trade touts" who call daily upon the householder.

The supply engineer who follows in the path clearly shown by the late chief engineer of the Glasgow Corporation will develop electricity supply and establish his own reputation by realising that the established electrical contractor is the surest agency for this development. May we appeal to our supply authorities to employ established firms who have a reputation to lose and who have the resources to carry out any class of installation work, in place of pandering to the cult of the "bottom price" and indifferent workmanship?

The station engineer has apparently forgotten that in bygone days he also has proved a hindrance to the advance of electricity supply and has harassed the contractor by framing regulations which have served no useful purpose. Finally, we trust that the present intention to compete for the trade of the contractor will be defeated. It is unthinkable that Parliament will permit a station engineer to act as the inspecting authority to the electrical contractor who is a ratepayer in the district whilst the supply authority is in direct competition for the same business.

**"The Pilgrim."**

*March 2nd*, 1926.

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I was much amused by Mr. L. L. Robinson's magnificent article in the current REVIEW, but I quite fail to get his meaning.

In arguing the case for municipal retail trading, Mr. Robinson completely ignores the vital objection, that of a municipal body entering into competition with its own ratepayers, and blatantly defends his position by implying that electrical contractors are incompetent, inefficient, and generally out to swindle would-be consumers.

As proof, Mr. Robinson tells us he lives up in the air and cites the case of his water supply; apparently his plumber did those things he ought not to have done and left undone those things he ought to have done, with the result that when Mr. Robinson says "Let there be water," there is not water, or, if there is water, it is in the wrong place.

I freely admit that this is a very good argument in favour of municipal supply authorities selling 27 vacuum cleaners per week, but, also, is it not a clear case of accepting the lowest tender from anywhere, or anyone, instead of having a correct specification drawn up by someone duly qualified?

As a matter of fact, I live on the ground floor, in quite a nice little house—with the possible exception that the wife thinks the wallpaper in the second bedroom rather bright—and all our water work was carried out by an existing plumber—I should hate to have work done by a plumber who did not exist—with the result that when the bath tap is turned, out comes the water, beautifully clear, warm, and wet, and not a drop runs into the bath of Jones on the other side of the road. This, according to Mr. Robinson, is a clear case against the practice of retail trading by municipal supply authorities.

Mr. Robinson states that "in my area the united efforts of the retailers did not connect four vacuum cleaners per month to my mains." Is Mr. Robinson absolutely certain this should not read five? I only mention this because I once sold a vacuum cleaner, it was quite a long time back—before the war really—and, believe me (of course, this is in strict confidence) to this day our supply authorities are unaware that that cleaner was ever "connected to their mains."

Try to visualise an electrical contractor connecting even one vacuum cleaner to the mains of Mr. Robinson, M.Inst.C.E.: what a subject for Mr. Robinson H.E.A.T.H.

Bleats Mr. Robinson (the M.Inst.C.E. one), "Who is going to sell my product fast enough to make it ever cheaper? The contractors have not done it in the past." "Rot!" shouts Mr. Contractor, "I have built up the industry for you, and for fifty years have consistently advertised and sold your product, making your stations what they are to-day."

Mr. Robinson very definitely implies that all contractors put in wires too small, therefore, I can only infer that all municipal supply authorities who undertake wiring, carry out their work flagrantly against all rules devised for public safety, namely, generally wire houses and even business premises with unprotected rubber-covered cables threaded through the joists between floors and ceilings, as described by a disgusted wireman, on the "one knit and two purl" principle, the only protection accorded the whole system being casing and capping for actual surface runs, presumably to prevent consumers using the cables for airing purposes.

At least, that is how thousands of premises are wired by our municipal supply authorities, the same kind of work being carried out by local contractors, not because they prefer to skimp, but simply because such work is recognised as the standard for house wiring by the municipal authorities themselves.

Yes, Mr. Robinson, thousands of houses wired with unprotected rubber cables run through the joists, and the work carried out by one of the cannot-do-wrong, all-for-public-safety, municipal suppliers; and, because the work is carried out by such, it is passed by fire insurance offices, offices which flatly refuse to pass similar wiring for a 1-kW plant outside our supply area "because it is not safe."

For goodness sake, Mr. Robinson, get a piece of india rubber—and rub yourself out.

**Registered Contractor.**

*March 2nd*, 1926.

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I envy Mr. Robinson his temperament. How delightful a place must appear this unhappy world to one who can find humour in the struggles for existence of his fellow workers. The spider, merry fellow, gloating in a corner of his web, no doubt finds humour in the quaint antics of the enmeshed

fly. The jolly murderer, standing on the bank, hands thrust deep in his fur-lined coat, probably finds the floundering of his victim in the ice-cold water excruciatingly funny. Mr. Robinson, not content with laughing at him, throws verbal brickbats at him. He tells him—the electrical contractor—in effect that he is slow, inefficient, greedy, and not too scrupulous. He sneers at the title of the E.C.A. pamphlet, at its very colour.

What is his objection to "Electrical Freedom" as a slogan? Would he deny to the unfortunate contractors the freedom to earn their living? It is all they ask. Does he consider them so very unreasonable in pleading for freedom from the artificial, unfair, rate-aided competition of public suppliers of electricity; for the same freedom to ply their trade as other ratepayers have?

Mr. Robinson argues both ways. He argues that water being an absolute necessity must obviously be a public supply. Nobody is likely to contradict him. He also argues that electricity, *not* being an absolute necessity, must also be a public supply. On the same reasoning the French have made railways and matches public supplies. The fatal results, so far as railways are concerned, can be read in every other day's paper; and, as for matches, any man brave enough to smoke French tobacco—another State monopoly—must keep a candle-end burning to light it as we did in the dug-outs.

Since anything, according to Mr. Robinson, which either is or is not a necessity may fairly be made a public supply, then are the Bolsheviks justified! So is the policy of our own Communists. Water, gas, electricity? Why not coal—as nearly a necessity as artificial light? Why not railways and general transport? Why not land and all the means of production? Why not, in short, the whole programme of Socialism?

Mr. Robinson's argument goes on thus: Granted electricity supply should be in the hands of public authorities, then they are justified in seeking control of all subsidiary services. They are not only entitled to have the monopoly of supplying electricity, but of supplying the installations to which their supply is supplied; and the vacuum cleaners, and the fittings, and the lamps, and the pretty little silk shades. (Beware, ye drapers! 'Tis but a step from silk "flounces" to silk petticoats!) One wonders why they should stop at installation work and fittings. The obvious logical development is to *manufacture* the wire and conduit and fittings necessary to the installations necessary to the supply; and, a little further, vacuum cleaners, fans, motors, generators, turbines, boilers and—well, pretty well everything!

I do not know who Mr. Robinson is, but I gather from his article he is a public supply engineer, perhaps in the Metropolitan area: one of the vast and ever-growing army of bureaucracy which is slowly strangling British enterprise and independence. Democratic bureaucracy is but another aspect of Socialism; so that his opinions are natural enough to one in his position. But they are not yet, thank heaven, the opinions of the bulk of the British public; nor, I venture to say, of any but a small, self-interested minority of your readers. The others—not only the thousands of contractors to whom the Review has always been the standard of freedom of, at least, opinion—but the wholesalers, and the manufacturers, and everybody else connected with the electrical trade whose prescience foresees the threatened monopoly of the municipalities: all these, if they are wise, will energetically support the contractors' modest plea for the right to exist. They are in the van of the fight against communistic competition. They need—they deserve—the support of all who are not Bolsheviks, nor bureaucrats.

The E.C.A. pamphlet makes, to my mind, too great a concession to the public supply engineers in professing the belief that the supply of electricity should be under State or semi-State direction or regulation. Under State discipline, yes, as is, ultimately, every enterprise in the kingdom. But not, necessarily, under State or municipal monopoly. On the contrary, private companies can and do supply electricity as efficiently as any corporation, with all its adventitious aids and non-commercial advantages.

Conceding to Mr. Robinson, however, as much as have the E.C.A., it does not follow as axiomatically as he seems to think it should, that they should concede to him control of their own work. If he can prove that "the municipalities give the cheapest and most efficient supplies of electricity," he has still to prove that "they or the companies" can "likewise supply the cheapest and most efficient installations and service to consumers." It is a very different matter. He asks for "any sound reason" to the contrary. There are a score that the E.C.A. could adduce; but it is for him, first, to find any reason, beyond the mere greed and self-sufficiency of Bumbledom, for curtailing the already restricted field of the electrical contractor.

Mr. Robinson builds what case he has on the alleged deficiencies of certain contractors. He says: "Do not contractors for electrical wiring . . . put in wires so small to lighting points that . . . they are found wanting," and so on. He accuses them—those, at least, in his area—of slackness and inefficiency, of timidity, of lack of energy and imagination. These sweeping criticisms may, or may not, be true of the contractors in his area—the probable explanation being that the wiser contractors have long ago left it; they may be true of certain "contractors" elsewhere—I have said harder things myself, in your pages, of the jerry wireman; but they are not true of electrical contractors as a whole. They are as able, and as likely, to wire a building adequately as any spoon-fed municipal wiring department, in spite of the fact that they have to do so in the face of competition from which the department is usually exempt. The contractor's canvasser is as keen as any municipal employé to sell vacuum cleaners and other electrical devices. The contractor himself is at least as anxious to secure new business as any supply engineer can be. Human nature being what it is, which has the greater incentive to do so: the contractor whose profit, whose very existence, depends on his energies; or the public employé, with fixed salary, whose interest—on behalf of his nebulous paymasters, the ratepayers—is only a varying function of his sense of duty?

I hold no brief for the E.C.A., with whose policy I sometimes find myself in imperfect sympathy, and I have no doubt the pens of their experts are already dealing more adequately than I can with Mr. Robinson's attack. I write simply as one who, after a quarter of a century's experience in the contracting trade, sees its very existence threatened by the strangle-hold of rate-aided municipal Socialism. But I venture to suggest, from my experience, one or two questions that the E.C.A. could, with advantage, put to Mr. Robinson.

For instance: Is the specification of the work he gives out to registered contractors in his area in accordance with the I.E.E. rules? If not, how far does it fall short of them? I have known corporation wiring work standardised on the lines of unprotected V.I.R. cables run through bored joists.

What is his calculated cost per average lighting point? What, if any, allowance does he make therein for rent, rates and taxes, salaries, and other standing charges? What is the price per point at which he offers this work to contractors?

If there is, as he says, a margin of 20 per cent. profit thereon, why is he not consistent? Why does he not have the work done by his own men, and so save the profit for his ratepayers? If, on the other hand, there is *no* margin of profit—and that seems to be the opinion of his local contractors—why is he so surprised and aggrieved that they don't "scramble" for his orders? There's some nigger in the woodpile. Contractors turn up their noses at 20 per cent. profit no oftener than supply engineers make them a present of it!

Finally, Mr. Robinson boasts a little of his selling successes—it would be interesting to know how many washing machines and bath water heaters he has *sold*—not hired—during the last year. It is possible that the actual figures will prove less impressive than the bare names; unless the consumers in his area have either fuller pockets, or softer heads, than they have, for instance, in the Eastern counties.

I have no doubt that Mr. Robinson, personally, can give perfectly satisfactory answers to all these questions. I put them down haphazard, with nothing, in my ignorance of himself, his area, or his activities therein, to guide me as to the possible answers. But this I know, and so does every member of the E.C.A.—not one in ten of the other supply engineers throughout the country who compete with their local contractors could, within the limits of truth, satisfactorily answer that short catechism.

**H. R. Taunton.**

Norwich, *March 2nd*, 1926.

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Proofs of the above letters were forwarded to Mr. Robinson, so that his reply could be published simultaneously. He writes as follows:—

I have read the correspondence relative to my article with a sense of great disappointment.

My article was intended to be provocative—I hoped it would bring forward some really useful suggestions for the good of the electrical industry—some suggestions for wholesome co-operation—a change from the old attitude of so many of the numerous but less important contractors which is by no means the attitude of the few and better class contractors, to one which would lead to the supply industry helping the contractors and to the contractors lending their loyal support to the supply industry, both bearing in mind that their first duty is service to the public.

Instead of this the correspondence is composed mainly of senseless vituperation and little pin-prick details—a discussion on the pros and cons of municipal trading.

This is not a question of municipal or private trading.

The real question is whether a supply undertaking, whether company or municipal, should carry its service right through to the consuming apparatus in order that the consumer may receive perfect results or whether it should stop short at the meter.

The experience of the gas companies at home and of the electricity companies abroad, especially in America, is that the supplier of the electricity or gas must see his job right through, (*a*) by co-operation with the contractors if they will co-operate on reasonable terms, or (*b*) without them if they won't.

Mr. Taunton's letter illustrates an unfortunate attitude of mind. He says: "What is his objection to 'Electrical Freedom' as a slogan? Would he deny to the unfortunate contractors the freedom to earn their living? It is all they ask. Does he consider them so very unreasonable in pleading for freedom from the artificial, unfair, rate-aided competition of public suppliers of electricity; for the same freedom to ply their trade as other ratepayers have? To this I reply: Why deny to the electricity supply authorities the freedom to accelerate the rate of the development of their electric supply? Is not that what the Government and all of us ought to be out for?

To conclude, may I reiterate that so far as I am concerned this is not a question of municipal or private trading. For my

sins, I suppose, I happen to be a municipal engineer, but this has not biased me in favour of municipal trading. I am a shareholder in many company undertakings. On the contrary, I feel sure that we workers in the industry would have been better off if there had been less municipal trading in electricity supply, though statistics show that probably the public would have had to pay more for their electricity. But I say that if it is wrong for the municipal suppliers to give service right up to the consuming devices, then it is wrong for them to have anything to do either with supply, service, or equipment. However, if municipal trading in electricity is what the public want, then to be as nearly perfect as possible the municipal suppliers must have electrical freedom to give the consumer their best and unrestricted service.

**L. L. Robinson,**
*Borough Electrical Engineer.*

Hackney, *March 6th*, 1926.

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I have been amused to read Mr. L. L. Robinson's article on "Electrical Freedom—The Contractors' Creed," in your issue of February 26th.

As a direct consequence of intensive installation and retail sales competition on the part of his undertaking, Mr. Robinson has very largely succeeded in driving electrical contractors out of his territory. To-day he turns round and complains that contractors in his area are not up to the mark—that they are doing no business! I know, of course, how Mr. Robinson laughs up his sleeve at the whole position; but the laugh is not all on his side.

Has Mr. Robinson heard of the position in Glasgow, Manchester, Birmingham, or the North-East Coast? In all these areas there are crowds of electrical contractors doing excellent business. They are working hand in glove with the municipal authorities and power company (Newcastle) concerned. How comes it about that the *reverse* situation prevails in Hackney? Has Mr. Robinson never put the question quietly and seriously *—to himself?* And has Mr. Robinson been privileged to hear what the general electrical trade (manufacturers and wholesalers) think of the Hackney situation as compared, let us say, with the Glasgow situation? I am afraid, Sir, that you would be unwilling to print some of the expressions employed!

Mr. Robinson disputes the illustration used in "Electrical Freedom" concerning the sale of pipe-lines, kettles, baths, and so on, by existing water boards and authorities. Not content to point out that water is an "absolute monopoly," Mr. Robinson proceeds to condemn existing plumbers and all their works. In support of this he describes certain bad plumbing (executed by private firms) in his own third-floor flat. Surely, however, the plumbing work in Mr. Robinson's flat was designed by the architect or builder? Why blame the plumber (probably operating on a cut price) for the shortcomings of the architect, consultant, or builder? The point is of great importance because advocates of the Robinsonian point of view are for ever demanding better (more convenient). installations, and at the same time, are for ever demanding that the cost of installations shall be reduced to lower and lower levels. How can we have plenty of "convenience" outlets, multiple switching, and "more copper in house-wiring" (as recently advocated) unless the consumer (ultimately, or by some means) is prepared to pay for them?

Mr. Robinson says that he is anxious to put wiring work in private hands, such work to show "at least" a 20 per cent. profit on *his* costs. Will Mr. Robinson please publish his costs together with his schedule of prices for the general edification (and, perhaps, instruction) of the trade?

Awaiting these figures,

**T. E. Alger,**
*President, The Electrical Contractors' Association (Inc.).*

London, *March 3rd*, 1926.

[Mr. Alger's letter, though dated March 3rd, was not received until March 6th; it was therefore too late to be replied to in the above communication by Mr. Robinson.—EDS. ELEC. REV.]

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### Engineers' Salaries.

I was very interested in the recent discussion in your columns on the salaries of combustion engineers, and I should very much like to have your readers' opinions on the following:—

I am an engineer in charge of a factory not far from London. I am responsible for the running, upkeep, and maintenance of steam, electrical, and Diesel plant, and all other machines in the factory.

The horse-power of prime movers equals 1,300 h.p. In addition, I have under me a large staff of fitters, carpenters, painters, labourers, &c., about 40 men in all.

I have had a wide experience in mechanical and electrical engineering. I have had a few years at sea, 14 years' central-station work as chief and assistant, and I have been in my present position nearly 10 years.

I have as a so-called assistant a man some years younger than myself, who knows very little about steam plant, nothing about electrical machinery, and, from my point of view, is of very little use to me. Moreover, he has only been with me about two years, having been engaged not by me, but by one of the firm. Recently, I learnt by accident that he was in receipt of a salary only £70 a year less than I am receiving.

What do your readers think my salary should be in view of the above experience, and what would they consider a comparative figure for my assistant?

**A. C.**

London, *March 6th*, 1926.

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# Parliamentary News.

**[By Our Special Parliamentary Reporters.]**

**The Electricity Bill.**—On March 8th, Mr. BALDWIN stated that before the House separated for Easter he was very anxious to get the Electricity Bill through its second reading. The earlier the Bill got through that stage the better, because there would be an enormous amount of work to be done in the Committee stage. If they could not get to the second reading before the end of the month there ought to be no difficulty in getting to it immediately the financial business was out of the way.

Mr. RAMSAY MACDONALD said that it was absolutely essential that the House should have full time to consider such a measure as the Electricity Bill. The second reading should only be given after very generous time for debate.

**Cable Contracts.**—On March 8th, Sir W. DAVISON asked Col. Ashley whether the Ilford Council had recently placed orders in Germany and Belgium for electric cables and if such orders should not be kept in the country in view of the state of employment.

Col. ASHLEY said that he had no information on the subject.

Mr. DUNNICO said that the difference between the lowest British tender and that accepted amounted to £1,000 representing a halfpenny rate in the district. He considered that the Cable Makers' Association was exploiting the country.

**Municipal Electrical Trading.**—The electrical contractors are again opposing, in the present session of Parliament, the insertion of a clause in municipal Bills giving power to municipal electrical authorities to provide and deal in fittings and apparatus, and to wire premises. A similar clause was opposed last year by the contractors in the case of one or two Bills (see ELECTRICAL REVIEW for August 7th, 1925, p. 214).

In the present session the clause has been inserted in the Doncaster, Swindon and Guildford Corporation Bills, and petitions have been deposited against these Bills by electrical engineers and electrical contractors, and other ratepayers in the three boroughs. On March 3rd the Court of Referees of the House of Commons, over which Mr. J. FitzAlan Hope (Chairman of Ways and Means) presided, was to have considered an application by the Corporations concerned for a ruling that the petitioners had no *locus standi* and should not be allowed to oppose the Bills. By the time the matter reached the Court, however, agreements had been come to in all three cases. The Corporations concerned had admitted the right of such of the petitioners as were electrical contractors to be heard on the question of competition only, but denied the right of individual ratepayers to be heard. The Court was therefore asked to register the agreements, and this course was agreed to.

**Railway Bills.**—On March 4th, Mr. BARNES, a Labour member, moved the rejection of the London Electric and Metropolitan District Railway Companies' Bill, and criticised the administration of the railway and the fares charged in the East End of London.

Mr. KIRKWOOD urged the Government, in conjunction with the railways, to convert the underground railway system of Glasgow, where the motive power was steam, into an electrical system for 30 miles in and around the city. This, he said, would give employment to a number of engineers, and make the underground journeys more congenial.

Mr. FIELDEN said that that question was having the attention of the London, Midland and Scottish Railway Company. Such a scheme would undoubtedly help unemployment. He could not say, however, that the change-over from steam to electricity would take place in the immediate future.

After some discussion the Bill was read a second time, as was also the London, Midland & Scottish Railway Bill.

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# Legal.

### Bonnella v. Espir.

MESSRS. ARTHUR BONNELLA and George Thomas Bonnella, electrical engineers, of 11, Bucknall Street, Bloomsbury, W., applied in the Chancery Division on March 5th, before Mr. Justice Russell for an interim injunction till trial to restrain Camille Espir, of 19, Hanover Square, from infringing the English letters patent, No. 26,635 of 1913, for electrical hanging switches.

The plaintiffs, said their Counsel, Mr. Cripps, were very considerable manufacturers of electrical fittings, manufacturing under this patent ever since it was created. Their switch contained a spring plunger terminal and other parts which were fitted into a hollow cylinder.

Mr. TREVOR WATSON replied that the defendant sold something substantially different as agent for the foreign-made

switch which was in question, and if he were restrained his business would be taken away and his agency would go elsewhere. Defendant's experts made out a *prima facie* case that there was no infringement and that the patent was limited to certain definite integers, and these were not to be found in the defendant's switch. The defendant's switches did not have spring plunger terminals.

Mr. Justice Russell said that to succeed with an interlocutory application the plaintiffs must establish a strong *prima facie* case, both with regard to validity and infringement. As to validity they succeeded. As to infringement, in none of their affidavits was to be found a direct allegation of infringement, and the defendant's expert, on the other hand, had established a *prima facie* case that the plaintiffs' patent was a limited patent. Plaintiffs had failed to discharge the onus laid upon them to secure an interim injunction, and there would be no order except that the costs in the motion should be costs in the action.

### Empson Centrifugals, Ltd., v. Chadburn and the De Laval, Chadburn Co., Ltd.

An action brought by the plaintiffs against Mr. W. Roy Chadburn and the De Laval Chadburn Company, Ltd., to recover damages for alleged libel, came before the Lord Chief Justice and a special jury on March 3rd.

The plaintiffs alleged that in a letter to a firm of solicitors the defendants libelled them by stating that there was a doubt about their financial status and in two pamphlets to customers the defendants endeavoured to injure and disparage the plaintiffs' business by implying that the plaintiffs were fraudulent traders who sold goods which they knew to be worthless.

The defence was that the letter was privileged and that the pamphlets did not refer to the plaintiffs at all.

Mr. Raynor Goddard, K.C., for the plaintiffs, said that the parties were manufacturers of a centrifugal machine for extracting water and impurities from heavy used oils and were serious trade rivals. Mr. A. W. Empson had been agent for the defendants and afterwards opened business on his own account. He complained that Mr. W. R. Chadburn wrote:—"We have very great reason to doubt the *bona-fides* of your client's intentions due to the fact that since leaving us his affairs have not progressed satisfactorily and we believe the company he founded is not sound financially." Counsel said that Mr. Chadburn did not now say that that allegation was true.

Mr. Jowitt, K.C., for the defendants, said that the litigation was between two friendly trade rivals. If in the pamphlets or the letter words had been used that threw doubt upon the integrity, honour and good faith of Mr. Empson or the plaintiff company the defendants would at once withdraw them. A juror was then withdrawn and the case concluded.

### Russell v. Schiskha.

In the Mayor's and City of London Court on March 5th, Mr. L. C. Russell, Holborn Viaduct, manufacturers' agent, sued Mrs. E. Schiskha, Brondesbury, for £26 10s. balance of an account for goods supplied. The plaintiff stated that he supplied two electroliers and other fittings to the defendant. One of the electroliers was damaged and he arranged to have it repaired. He denied that, as defendant alleged, he had promised to bear the cost of the repairs. The defendant's husband, giving evidence, averred that the plaintiff had undertaken to defray the cost of the repairs.

Judge Shewell Cooper accepted the plaintiff's evidence and gave him judgment for the amount claimed, with costs.

### Porn v. Chandos Court Mansions, Ltd.

In the Mayor's and City of London Court, on February 26th, before Deputy Judge Hinde, Mr. M. Porn sued the defendants for damages for breach of contract. Counsel for the plaintiff said that his client received an order for two lifts, which were to be installed by a given date. Owing to delay in building operations the plaintiff was unable to do that. By the contract he was to receive an order for a further two lifts within a period of eight months. By that time, however, the cost of labour and material had so increased as to preclude the plaintiff's obtaining any profit, and he alleged that an agreement for a higher price was obtained from a Mr. G. Ravenshore, acting for the defendants. Mr. Ravenshore later denied having entered into that arrangement, and the order was never placed. In the meantime there was an amount due for the original lifts, which was included in the present claim.

For the defendants, it was stated that the delay in the installation of the lifts was not due to any delay in building operations, but to plaintiff's inability to obtain the lifts from the manufacturers in Milan. With regard to the other two lifts, the defendants would have been willing to pay a higher price, but they would not consent to alter the terms of payment as suggested by the plaintiff, and the order went elsewhere.

The Deputy-Judge held that plaintiff had been delayed by the building operations, but he was not satisfied that a binding contract had been made for the latter two lifts to be supplied at a higher price. The plaintiff was entitled to damages for breach of the original contract, and he awarded him £75. To this was added £60 for work done, and £38 4s. 6d. for items set out in the particulars of the claim, making £173 4s. 6d., together with costs.

## Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

**1924.**

11,706. "Induction reaction motors." Sangamo Electric Co. December 18th, 1923. (226,479.)

21,345. "Automatic telephone exchange mechanism." A. Watts. September 10th, 1924. (247,243.)

23,814. "Induction motors with phase compensation." Deutsche Werke Akt.-Ges. October 8th, 1923. (223,234.)

23,927. "Telephone systems." Standard Telephones and Cables, Ltd. (formerly Western Electric Co., Ltd) (Western Electric Co., Inc.). October 9th, 1924. (247,247.)

23,955. "Induction electricity meters." S. Z. De Ferranti. October 9th, 1924. (247,248.)

25,068. "Electric resistance furnaces." G. E. Taylor and Electric Furnace Co., Ltd. July 20th, 1925. (247,254.)

26,483. "Thermionic valves." Radions, Ltd., and H. J. Osborn. November 6th, 1924. (247,260.)

26,537. "Electrically illuminated advertising apparatus." Scintillating Sign Co., Ltd., and H. S. Coleman. November 6th, 1924. (247,262.)

26,899. "Charging of electric accumulators." J. W. Burleigh and Rotax (Motor Accessories), Ltd. November 11th, 1924. (247,279.)

26,912. "Starters for electric motors." British Thomson-Houston Co., Ltd., G. O. Watson, and W. L. Wise. November 11th, 1924. (247,280.)

26,914. "Loud-speaking telephonic apparatus." E. A. Graham. November 11th, 1924. (247,281.)

27,071. "Electric fuses." C. W. Cox. November 13th, 1924. (247,289.)

27,146. "Rheostats." Lissen, Ltd., and R. P. Richardson. November 13th, 1924. (247,294.)

27,227. "Production of electric oscillations." Standard Telephones and Cables, Ltd. (formerly Western Electric Co., Ltd.). (Western Electric Co., Inc.). November 14th, 1924. (247,297.)

27,325. "Magnetic cores or other magnetic bodies, and the manufacture thereof." Callender's Cable & Construction Co., Ltd., and J. F. Watson. November 15th, 1924. (247,301.)

27,419. "Ignition apparatus for internal-combustion engines." F. H. Royce. November 17th, 1924. (247,304.)

27,650. "Ignition devices of internal-combustion engines." F. H. Royce. November 19th, 1924. (Addition to 198,014.) (247,306.)

28,063. "Electric switches specially applicable to electric motor starters." F. B. Cox. November 24th, 1924. (247,317.)

28,882. "Electron discharge devices." Standard Telephones and Cables, Ltd. (formerly Western Electric Co., Ltd.). (Western Electric Co., Inc.). December 2nd, 1924. (247,331.)

29,335. "Electric signalling systems." Standard Telephones and Cables, Ltd. (formerly Western Electric Co., Ltd.). (Western Electric Co., Inc.). December 6th, 1924. (247,333.)

30,904. "Apparatus for heating liquids by electricity." A. Torriani. December 23rd, 1924. (247,345.)

**1925.**

315. "Electric drive, more particularly for hoisting apparatus." Schindler and Cie. August 29th, 1924. (239,158.)

829. "Selecting switches for use in telephone systems." Siemens and Halske Akt.-Ges. and F. Döring. January 10th, 1925. (247,350.)

1,490. "Coil holders for wireless receiving sets." A. J. G. Robinson. January 17th, 1925. (247,360.)

1,734. "Sound-amplifying horns." G. G. De Andia-Yrarrazaval. January 20th, 1925. (247,361.)

2,282. "Variable condensers for use in connection with wireless telephony and telegraphy." J. B. Collingburn. January 26th, 1925. (247,365.)

3,637. "Means for balancing telephone cable circuits." A. H. de Voogt. October 29th, 1924. (Addition to 225,229.) (242,217.)

5,760. "Electric cables." Callender's Cable & Construction Co., Ltd., and S. J. Bryce. March 3rd, 1925. (247,401.)

6,609. "Aerial masts for wireless signalling." J. Smales. March 11th, 1925. (247,410.)

7,423. "Crystal detectors for use in connection with wireless apparatus." G. H. Comery and H. Rose. March 19th, 1925. (247,413.)

7,972. "Switchgear for automatic reversing electric motors." J. G. Stirk. March 25th, 1925. (247,419.)

8,751. "Means for illuminating the dials of switchboard instruments." Rotax (Motor Accessories), Ltd., T. Sparkes, and E. Hill. April 1st, 1925. (247,423.)

8,911. "Testing and calibrating apparatus for electric meters." F. H. Rogers (Zera). April 3rd, 1925. (247,424.)

9,840. "Spring clip for electrical conductors." National Carbon Co., Inc. September 17th, 1924. (240,120.)

12,985. "Vacuum tube arrangement." Standard Telephones and Cables, Ltd. (formerly Western Electric Co., Ltd.) (Western Electric Co., Inc.). May 18th, 1925. (247,440.)

14,683. "Electrical connector boxes." Soc. Genevoise D'Instruments de Physique. June 28th, 1924. (236,186.)

14,790. "Electrically-heated irons." H. B. Jackson. June 8th, 1925. (247,442.)

15,285. "Compensation of asynchronous machines by shunt commutator machines connected in cascade." Sachsenwerk Licht-und Kraft-Akt.-Ges. December 30th, 1924. (245,410.)

15,597. "Electron discharge apparatus and circuit arrangements therefor." British Thomson-Houston Co., Ltd. July 11th, 1924. (236,911.)

16,660. "Electric heaters for heating liquids." L. H. Veronneau. June 29th, 1925. (247,454.)

18,031. "Electric arc-welding apparatus." Harms & Co. December 20th, 1924. (244,703.)

19,054. "Thermostatic devices." Metropolitan-Vickers Electrical Co., Ltd. August 14th, 1924. (238,532.)

22,545. "Wireless signalling." Soc. Française Radio-Electrique. September 10th, 1924. (239,856.)

22,996. "Protective arrangements for alternating electric current systems." International General Electric Co., Inc. September 20th, 1924. (240,157.)

24,417. "Sparking plugs for internal-combustion engines." C. J. E. Isaksson and H. T. Tillquist. July 2nd, 1925. (247,491.)

28,657. "Electric power-factor indicators." H. Müller. November 13th,

**Teachers' Vacational Courses.**—Arrangements are being made by the Board of Education for short instructional courses in engineering science and electrical engineering for teachers in recognised technical schools, to be held at Oriel College, Oxford, commencing July 17th next. Application to attend the courses must be made to the Board of Education, on a special form, before March 26th.